The Electrical Industry's Weekly Magazine

June 25, 1956

Electrical World

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A McGraw-Hill Publication

Where Is EEI Headed?

An Interview with Donald S. Kennedy, the New President

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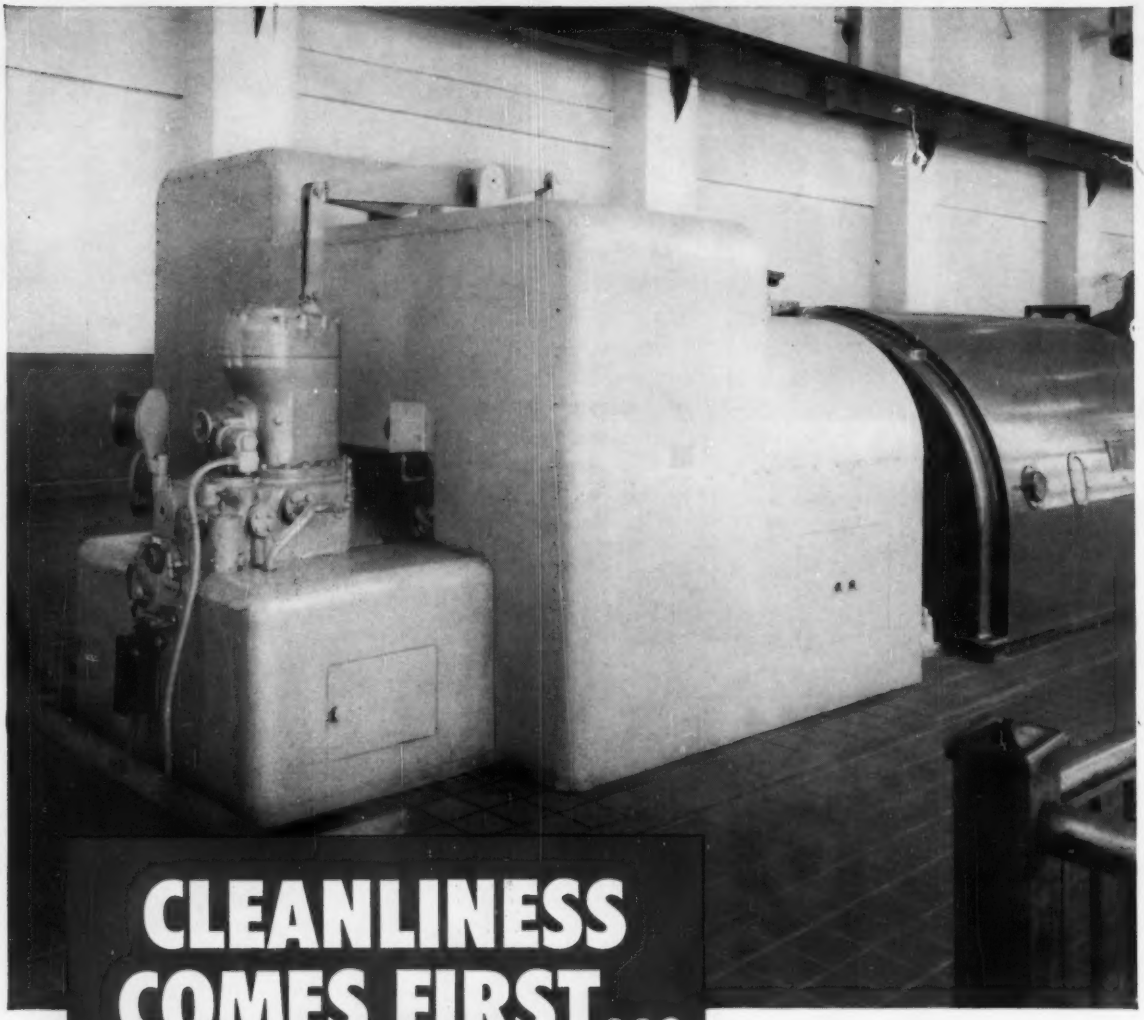

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Electrical World

Published for 82 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

Vol. 145 No. 26 **June 25, 1956**

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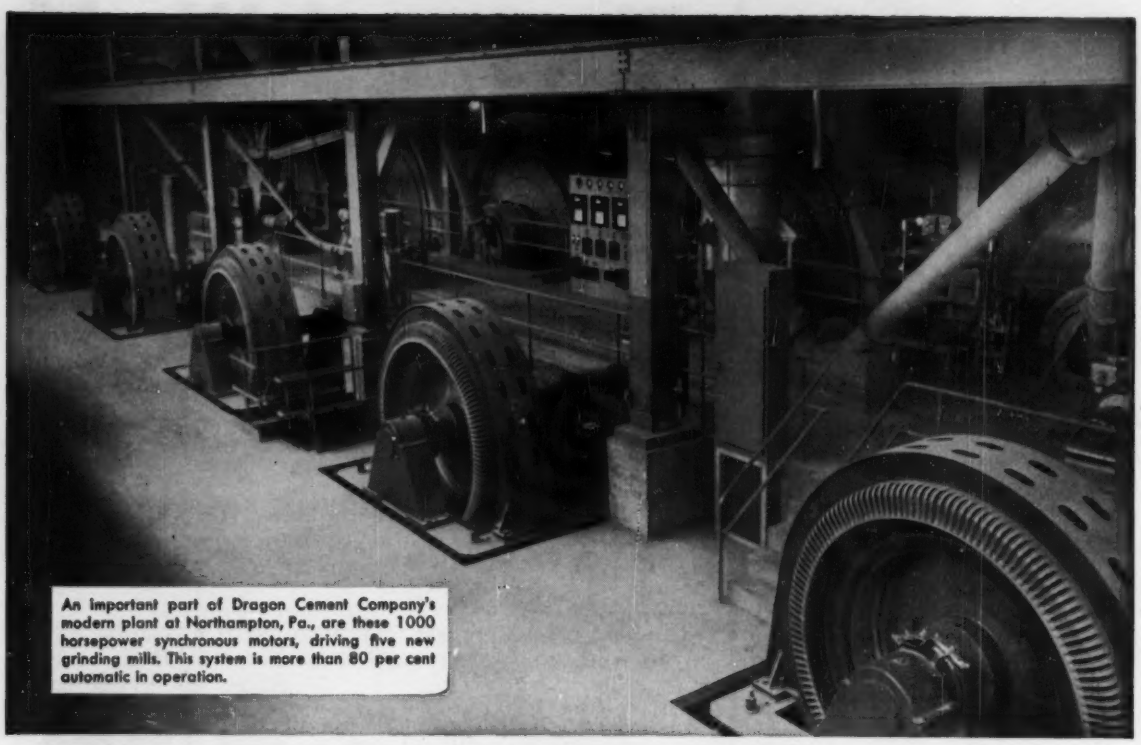


An important part of Dragon Cement Company's modern plant at Northampton, Pa., are these 1000 horsepower synchronous motors, driving five new grinding mills. This system is more than 80 per cent automatic in operation.

80% automatic, this plant specified OKOLITE-OKOPRENE cables

Since Dragon Cement Company's new mill was to represent the latest developments in cement making techniques, process control and automation were given the greatest consideration. This necessitated a reliable electrical power distribution system with dependable control circuits.

After thoroughly investigating the neoprene-jacketed wire field, they selected Okolite-Okoprene. In their new mill installation, 70 miles of cable were used for control circuits, and 25 miles for power distribution—all Okolite-Okoprene.

Dragon Cement Company is following a nation-wide trend of manufacturers to Okolite-Okoprene cables for circuits that must not fail. Okolite oil-base insulation, made from natural wild up-river Fine Para rubber, is moisture-, ozone-, and heat-resistant. The Okoprene sheath gives maximum protection from most harmful acids, oils and chemicals. In addition, because Okoprene's high surface resistivity prevents heavy longitudinal drainage currents, these cables are used in many

utility and industrial plants *unshielded* up to 5000 volts. When you order cable for circuits that must not fail, specify Okolite-Okoprene. Write for our new Bulletin EW-1085 for full details. The Okonite Company, Passaic, N. J.

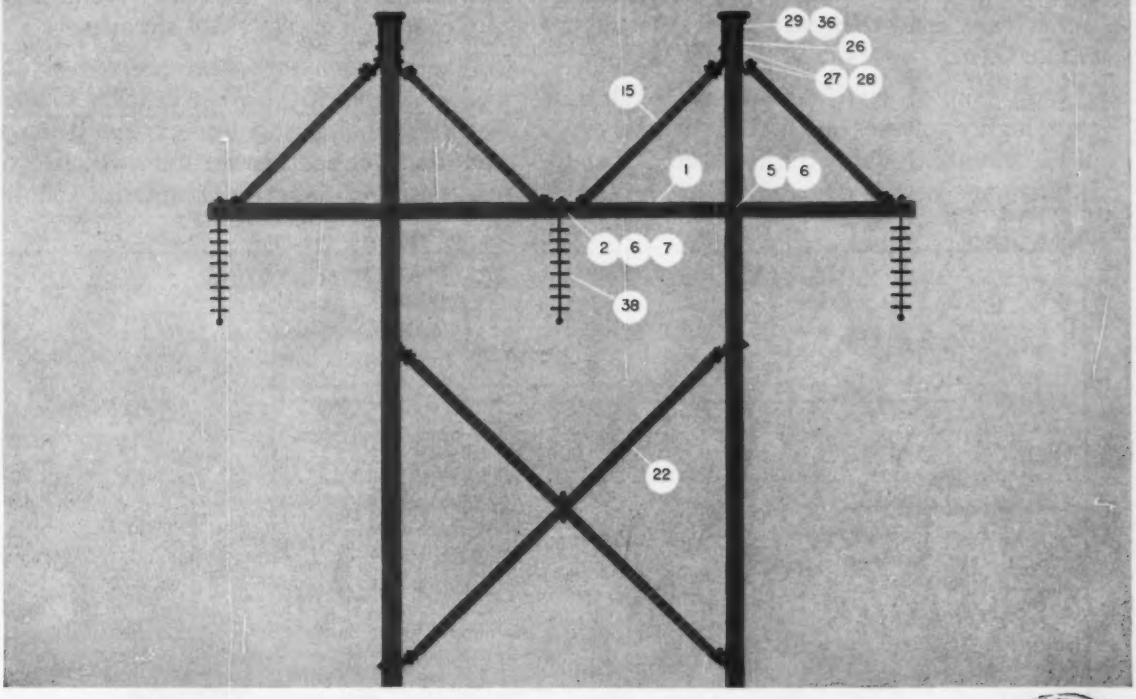
OKONITE SINCE 1878 *insulated cables*

2257

TANGENT W/BRACES NO. 702

H-FRAME STRUCTURE, DOUBLE PLANK CROSSARMS WITH METAL SPACERS, POLE TOP STATIC WIRE SUPPORTS, AND WOOD CROSS BRACES DESIGNED FOR 69 TO 154 KV CONSTRUCTION

DRG. REF. #	QUANTITY	DESCRIPTION	DRG. REF. #	QUANTITY	DESCRIPTION
792	2	Pole	15	4	Vee brace 3⅜" x 4⅜" cross section
1	2	Crossarm	22	1 set	Cross brace w/fittings, clamp, ⅞" pole bolts and curved washers
2	3	Steel spacer fitting w/mounting bolts	26	2	Static wire support
5	2	Stud bolt ⅞" w/washer nuts	27	4	Machine bolt ¾"
6	8	MF locknut ⅞"	28	4	MF locknut ¾"
7	1	Bent stud bolt ⅞" x 8" w/2 sq. nuts	29	2	Clevis
			36	2	Suspension clamp for static wire
7	2	Bent bolt ⅞" x 5½" w/sq. nut	38	As required	Suspension insulators and fittings



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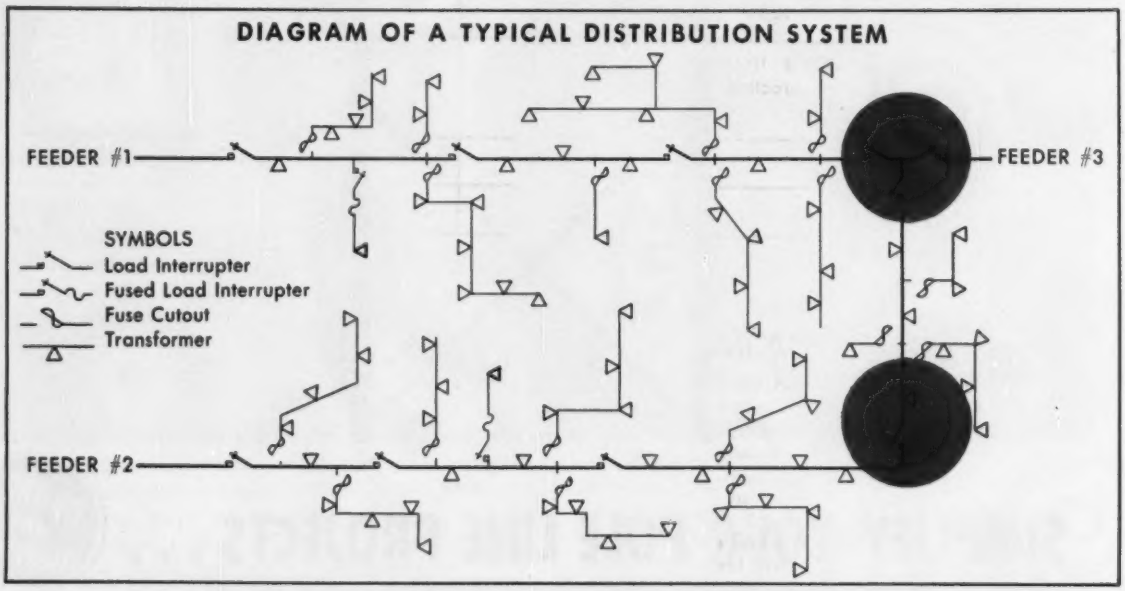
ARE BIGGER LOADS BRING IN SWITCHING YOUR 12 KV

With S&C Load Interrupters you can handle *all* switching duties on a typical distribution feeder—any load current, charging current, or magnetizing current.

With conventional disconnects or horn gaps, higher voltages and higher currents can mean serious trouble. With the S&C Load Interrupter there is no external arc, no danger of flashover, no hazard to personnel, no uncertainty. It can open the circuit *under any condition* except short circuit.

Whether your switching problem is at a feeder tie (see illustration below), at a sectionalizing point on a feeder, or at a branch tap, the S&C Load Interrupter will give you safe, positive, circuit interruption.



Typical application of S&C Load Interrupters (symbol) on distribution feeders. Circled in blue are specific cases—feeder tie points. Even here increased loads have made switching difficult in spite of the fact that parallel circuits are easier to open. Load Interrupters may be opened or closed on full line voltage and full load current—a real advantage during emergency conditions and a definite convenience under *normal* circumstances.

S&C

LOAD INTERRUPTER

Specialists in High-Voltage Circuit Interruption since 1910

S&C ELECTRIC COMPANY

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POWER FUSES • • DISTRIBUTION CUTOUTS AND FUSE LINKS • • LOAD INTERRUPTERS • • AUTOMATIC SWITCHGEAR

ING BIGGER HEADACHES DISTRIBUTION FEEDERS?

Performance Comparison of Switching Devices

PERFORMANCE	S&C Load Interrupters		Conventional Disconnects	
	Stick-Operated	Group-Operated	Stick-Operated	Group-Operated
Interrupt current from parallel sources safely?	YES	YES	DOUBTFUL	DOUBTFUL
Safe to equipment or personnel if inadvertently opened on full voltage (in case loop is open)?	YES	YES	NO	DOUBTFUL
Dump load without opening feeder breaker, or without preliminary unloading?	YES	YES	NO	DOUBTFUL
Multi-pole device controllable from ground (may be required by system practice or other circuits on same pole)?	NO	YES	NO	YES
Simple to install?	YES	NO	YES	NO
Cost?	LOW	HIGHEST	LOWEST	HIGH

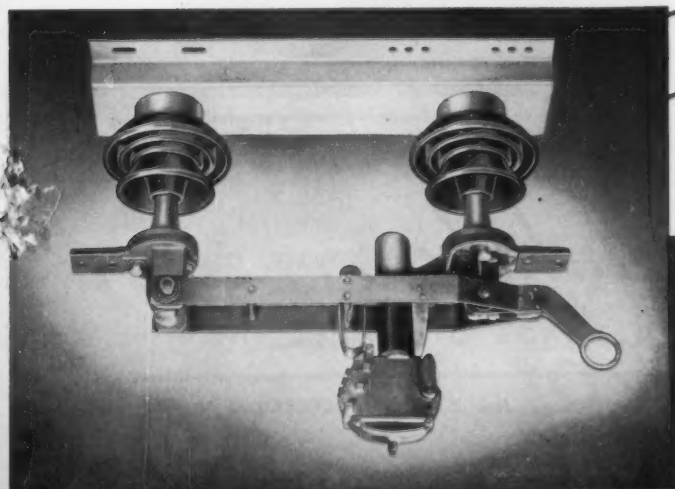
ABOUT THE S&C LOAD INTERRUPTER

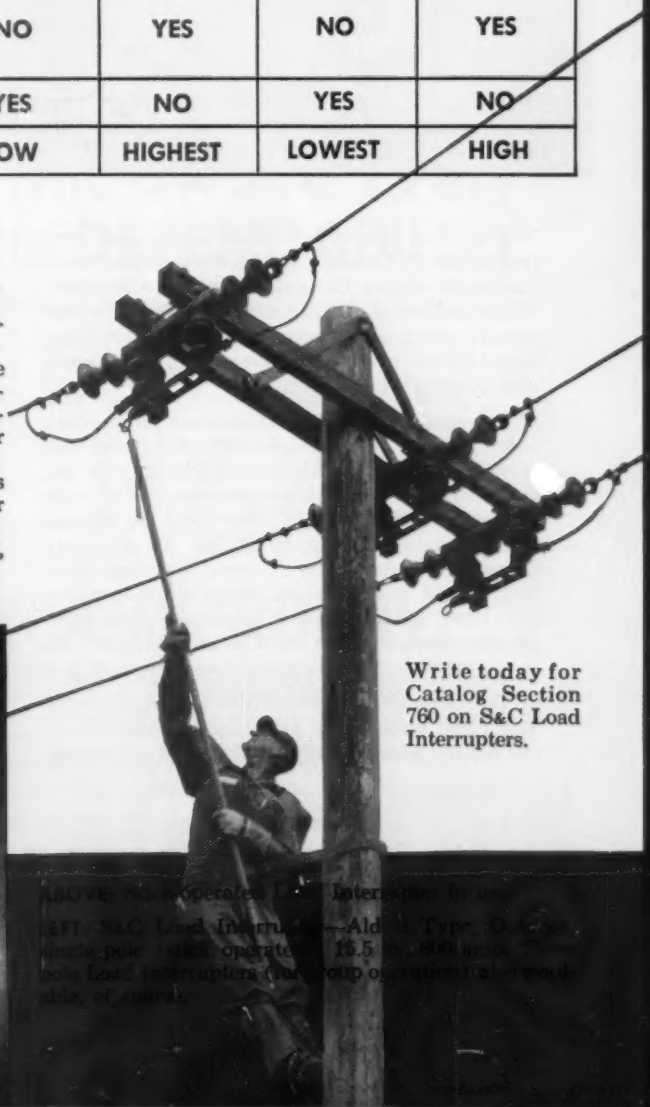
It can switch the circuit without unloading preliminaries and without opening the main breakers.

Switching cannot lead to dangerous phase-to-phase or phase-to-ground faults, because there is NO EXTERNAL ARC. Hence, there is no danger to men or equipment, even in case of inadvertent operation under emergency conditions.

It interrupts all load currents and charging currents instantly, making a clean, decisive break. The operator doesn't have to "dog" it.

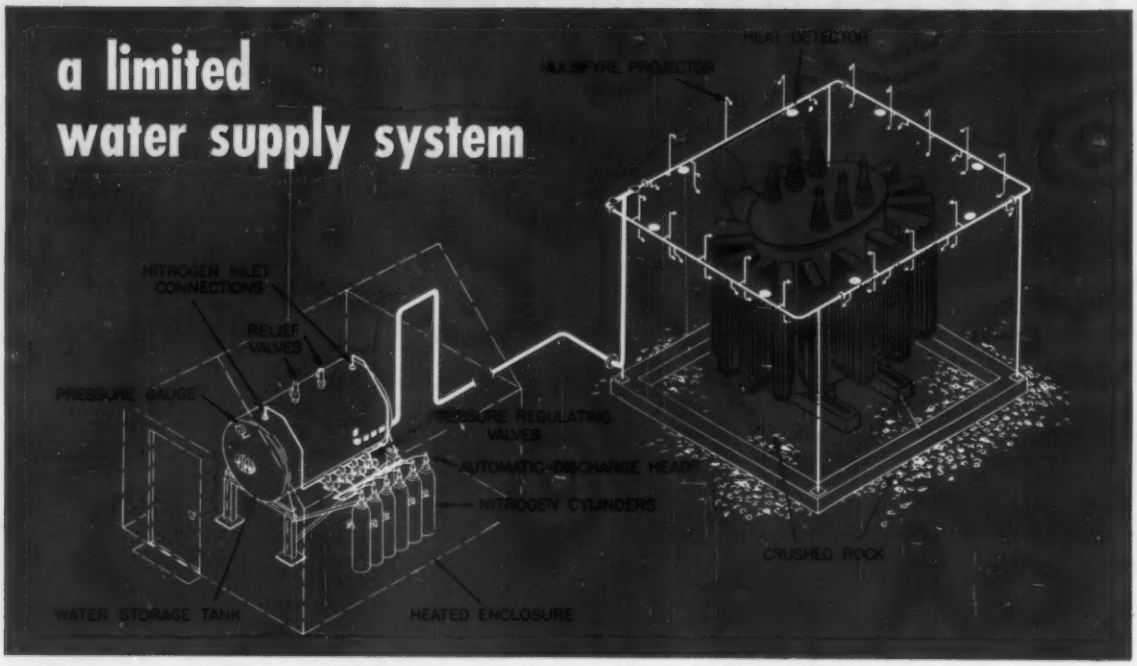
It can be mounted in any desired position—vertical, upright, or inverted.





Write today for Catalog Section 760 on S&C Load Interrupters.

NOW!
Grinnell SELF-CONTAINED Mulsifyre Protection

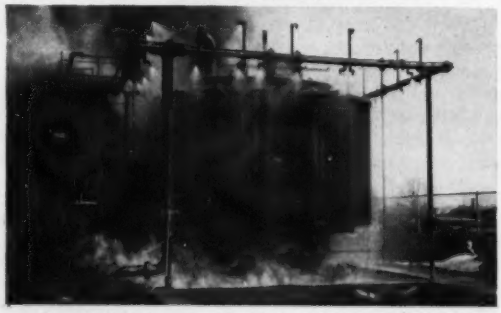


You need no longer be without water spray protection simply because your hazard is distant from city water mains. Grinnell's new *Self-Contained* Mulsifyre System provides automatic detection and prompt water spray protection in extinguishing fires while still small, and in preventing their spread with possibly serious damage.

Water spray protection, of course, presupposes water under pressure. Grinnell's *Self-Contained* System successfully achieves this through the use of nitrogen gas, stored in cylinders under high pressure, which drives the water from the storage tank at spray-forming velocities. As with all Grinnell Fire Protection Systems, the component parts of the Self-Contained Mulsifyre System are fully listed by Underwriters' Laboratories and meet specifications covered in NBFU Standards 13 and 15.

Your particular hazard will be thoroughly analyzed by the Grinnell Fire Protection Division, which introduced water spray protection in America — and has the widest possible background experience in its use. Full consideration will be given to the property to be protected, as well as to all other adjacent exposure hazards.

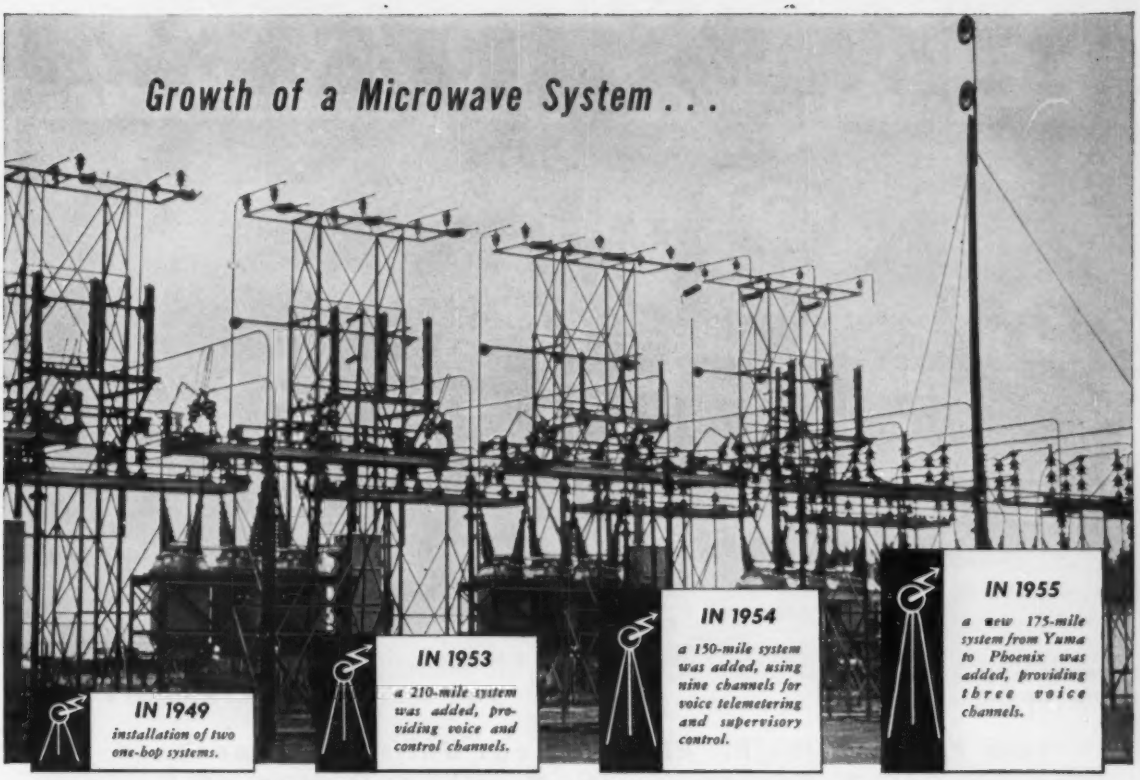
Let a Grinnell Fire Protection Engineer tell you more about this system. Grinnell Company, Inc., 252 West Exchange Street, Providence, Rhode Island. Branch offices in principal cities.



Grinnell *Self-Contained* Mulsifyre System successfully operating to extinguish fire under test conditions

GRINNELL *Mulsifyre*

EMULSION EXTINGUISHMENT OF OIL FIRES


Growth of a Microwave System . . .
IN 1949
installation of two one-hop systems.
IN 1953
a 210-mile system was added, providing voice and control channels.
IN 1954
a 150-mile system was added, using nine channels for voice telemetering and supervisory control.
IN 1955
a new 175-mile system from Yuma to Phoenix was added, providing three voice channels.

They Chose RCA Microwave Every Time Because of Its DEPENDABILITY

. . . for growing multi-station system at Arizona Public Service Co.

The original installation at Arizona Public Service Company in 1949 consisted of two RCA one-hop systems used to control unattended substations from the central steam-electric plant at Phoenix. Additional RCA systems were installed in 1953 and 1954, and again in 1955.

This steady growth with RCA Microwave—to the present multi-hop system—attests to its proven performance under the most trying conditions . . . including ambient 140 degree heat, high winds, severe electric and dust storms and violent rains.

Here also is proof of its ease of adaptability to future requirements. Through the years the dependability of this equipment has been virtually 100%. Completely independent of the transmission lines it services, it provides unfailing communications and control when needed most.

You can be sure of your microwave system's dependability if you first seek the advice of microwave engineers at RCA . . . world leader in radio and electronics. RCA equipment uses easy-to-service, familiar circuits and readily available tubes. It can interconnect with existing telephone lines, switchboards and mobile radio installations. Only RCA Microwave systems provide so many advanced engineering features. Get complete data.

RCA Microwave Specialists will be glad to answer any questions and help plan your installation. Mail coupon for further particulars on use of Microwave in utilities, pipelines, turnpike and other applications.

RCA MICROWAVE

POINT-TO-POINT COMMUNICATION

Performance proved in more than a million channel miles of operating systems throughout the world.

RADIO CORPORATION of AMERICA

COMMUNICATIONS PRODUCTS
CAMDEN, N. J.

Radio Corporation of America
Communications Products, Dept. FD-45, Building 15-1, Camden, N. J.

☐ Please send me latest literature on RCA Microwave.

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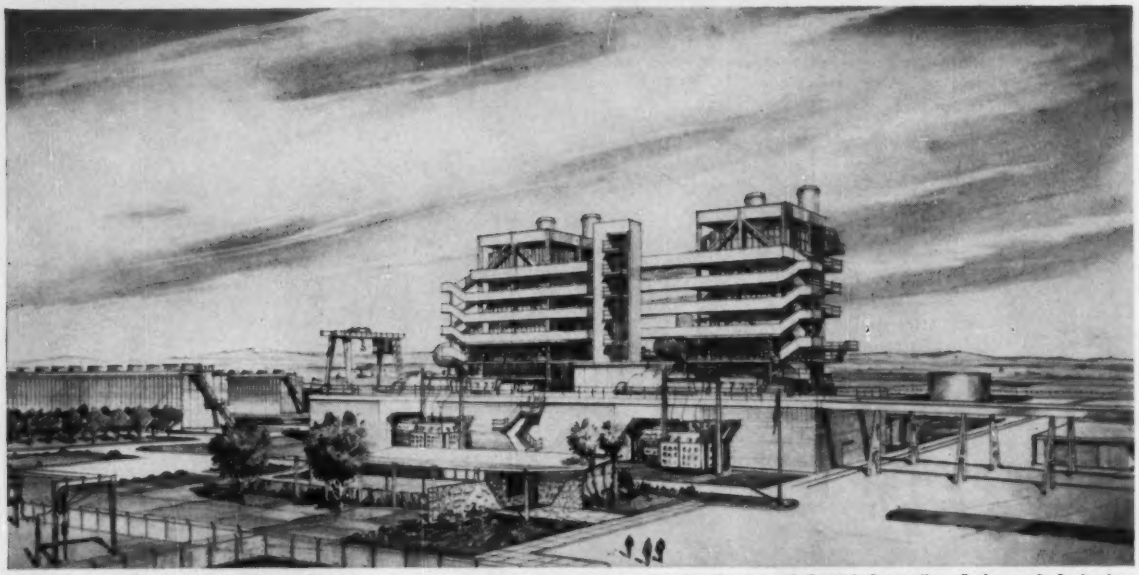
COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

☐ Have an RCA representative get in touch with me.

STEAM *by* RILEY *helps*



Agua Fria Steam Plant, Salt River Power District — Drawing Courtesy of Bechtel Corporation, Engineers & Contractors

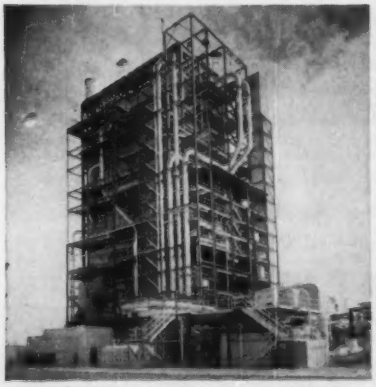
Two 750,000 lbs/hr. Riley Reheat Units, Monuments to a Miracle, Tower Above the Fertile Salt River Valley

The fertile Salt River Valley, an oasis carved out of desert wasteland, is attracting the attention of the entire country. For the ten years since 1945, Arizona has shown the greatest percentage gain in population in the country. Its manufacturing employment has increased 192% during the same period. Most of this expansion is taking place in the Phoenix area, served by the Salt River Power District.

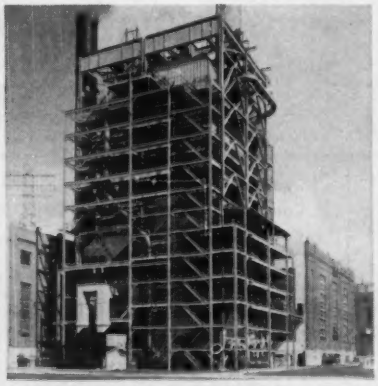
When the Agua Fria Steam Plant near Phoenix, Arizona, is completed, 200,000 kilowatts will be added to the Salt River Power District's electric generating facilities. This contribution to the continued expansion of Phoenix and the State of Arizona will provide additional generating capacity needed to keep pace with present and predicted increases in demand for electric service. Much of this capacity will be used by the pumping stations of a vast irrigation system that produces huge annual bounties of cotton, grains, cattle, vegetables, citrus fruits and flowers.

Riley is proud to participate in this miracle of expansion . . . . its two Reheat Units will stand as monuments to the vision and industry that has made Phoenix one of the fastest growing communities in the world.

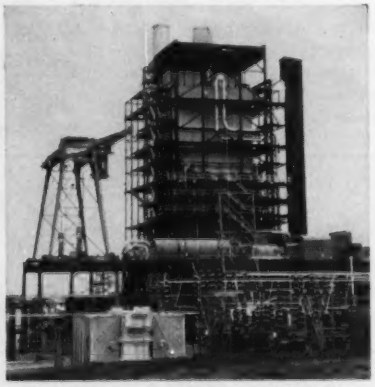
Other Riley Central Station Units in Southern and Southwestern States:



Ninemile Point — Louisiana Power & Light Co.
1,000,000 lbs/hr., 1005/1005 F. Reheat, 1725 psig

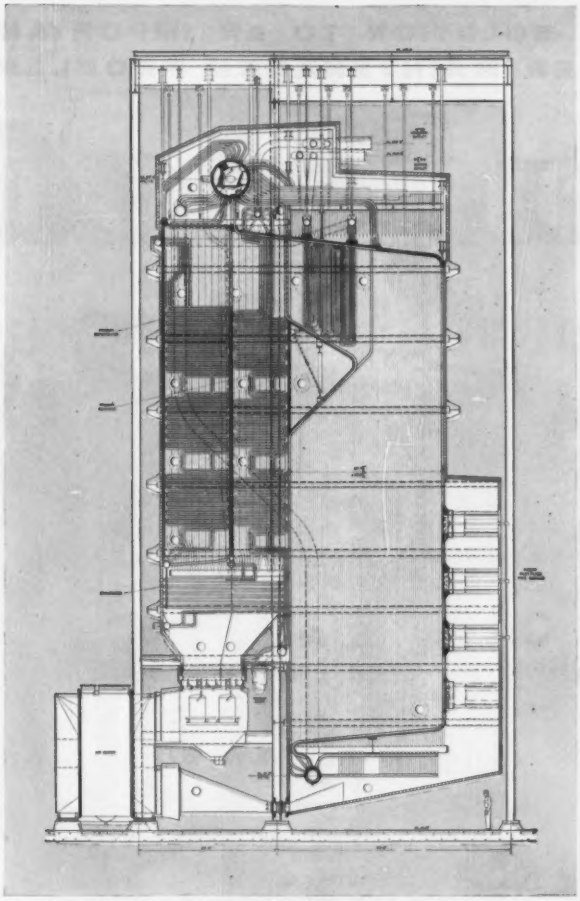


Deepwater — Houston Lighting & Power Co.
1,250,000 lbs/hr., 1005/1005 F., Reheat, 2125 psig



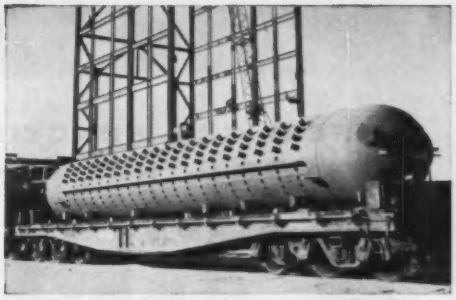
Mountain Creek — Dallas Power & Light Co.
1,050,000 lbs/hr., 1005 F., 1550 psig

ARIZONA PROSPER



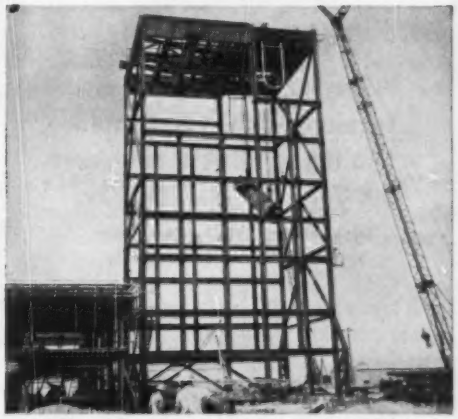
Design of the Riley Reheat Units at Agua Fria Steam Plant: 750,000 lbs/hr. 1005 F. Superheat, 1005 F. Reheat, 1500 psig. Furnaces are pressurized; to be fired initially by natural gas. Riley burners easily convert to oil.

Bechtel Corporation, Engineers & Contractors



75 ton steam drum is shown at it arrives at Agua Fria from Riley's Pennsylvania Boiler Plant.

Expert riggers safely hoist drum to top of structure.



Drum halfway to top. Structure is completely welded, except for drum supports.

Riley's Western Division uses huge crawler cranes for speeding work on tall structures. Boom is 140 feet long and is capable of hoisting 60 tons.

A survey of your plant by a consulting engineer could show ways of making surprising savings in your power costs.

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Sales Offices: Worcester, New York, Philadelphia, Buffalo, Pittsburgh, Cleveland, Detroit, Chicago, Cincinnati, Charlotte, New Orleans, Atlanta, St. Louis, Kansas City, St. Paul, Houston, Denver (Englewood), Salt Lake City, Los Angeles, San Francisco, Portland, Seattle.

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Corrugated

500 Kva, 15 Kv

Grounding switch internally mounted

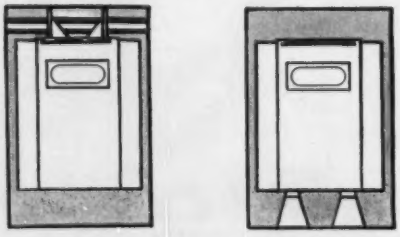
ONLY 50″ HIGH

Pennsylvania Network Transformers with Corrugated Cooling available in sizes 500-750-1000 kva. 5-15 kv.

Disconnect and grounding switch can be externally mounted.

CORRUGATED COOLED NETWORK TANK FEATURES

SUSPENSION MOUNTING OR PEDESTAL MOUNTING



CORRUGATED COOLING

for genuine ease of

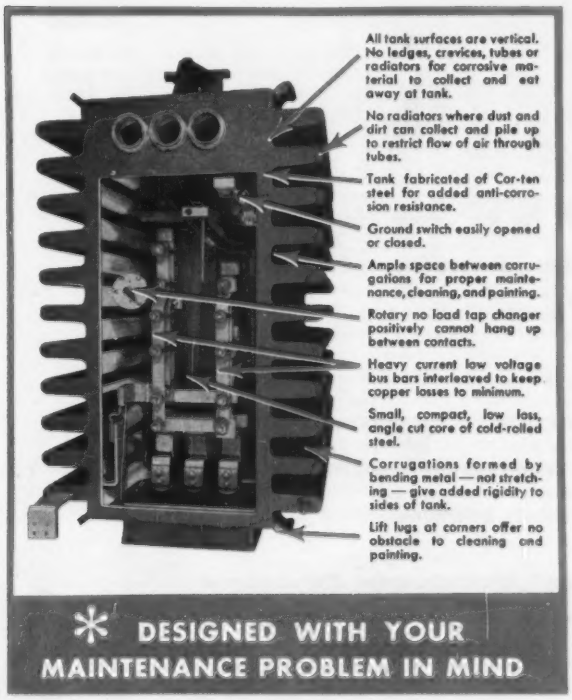
INSPECTION
CLEANING
PAINTING

Cooling*

IN PENNSYLVANIA'S NEW LOW-HEIGHT, SUBWAY-TYPE NETWORK TRANSFORMERS

In Pennsylvania's new subway-type network transformers, tank corrugations instead of conventional tubes and radiators provide the necessary radiating surfaces for proper cooling of the insulating liquid.

Tanks with smooth, vertical, corrugated surfaces have certain fundamental advantages for network transformers that are installed underground. They are easy to maintain properly in subway vaults where water, sludge, salt, and sewage are constantly eating and corroding away transformer cases and particularly transformer cooling tubes.


All tank surfaces are vertical. No ledges, crevices, tubes or radiators for corrosive material to collect and eat away at tank.
No radiators where dust and dirt can collect and pile up to restrict flow of air through tubes.
Tank fabricated of Cor-ten steel for added anti-corrosion resistance.
Ground switch easily opened or closed.
Ample space between corrugations for proper maintenance, cleaning, and painting.
Rotary no load tap changer positively cannot hang up between contacts.
Heavy current low voltage bus bars interleaved to keep copper losses to minimum.
Small, compact, low loss, angle cut core of cold-rolled steel.
Corrugations formed by bending metal — not stretching — give added rigidity to sides of tank.
Lift lugs at corners offer no obstacle to cleaning and painting.

* DESIGNED WITH YOUR MAINTENANCE PROBLEM IN MIND

The entire tank can be cleaned and even painted from a position above the transformer with complete assurance that the workman will be able to see and reach every bit of surface on the tank.

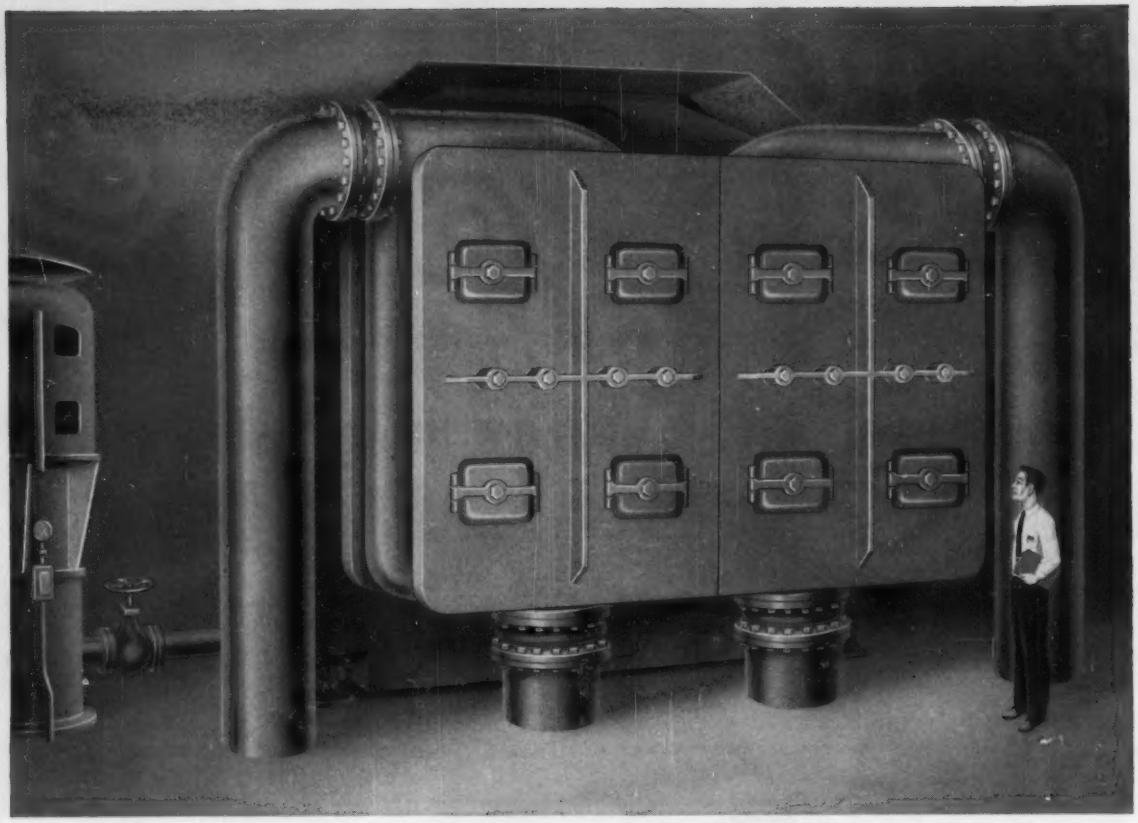
As a further measure of safety against corrosion, tanks, covers and bottoms are fabricated of Cor-Ten steel which has an inherent resistance to corrosion that is two to three times better than copper-bearing steel.

And there is more to this new transformer than Cor-Ten Corrugated Cooling. In the network transformer pictured here, where the grounding switch is mounted internally, the entire transformer, including the core and coils, was redesigned. It was reduced to two-thirds the size of the preceding model, which means it will fit into a small vault, or even replace a *smaller* Kva transformer in an existing vault. This particular model is only 50 inches high, and can be provided with brackets for suspension mounting, or pedestals for installation high above the floor of the vault.

If you are interested in learning more about these *really new* corrugated-cooled, subway-type network transformers, please contact Pennsylvania Transformer Company's Power Sales Department. Competent engineers will be happy to come to your office to discuss these transformers in complete detail.

PENNSYLVANIA TRANSFORMER COMPANY

A McGraw Electric Company Division • **CANONSBURG, PA.** • *Greater Pittsburgh District*



"Maryland's" Industrial Products Division has broad experience in the manufacture of condensers ranging from 515 to 100,000 square feet. Illustrated is a 17,000 square foot condenser designed by Marind.

MARIND has complete facilities for the design, manufacture and installation of condensers, feedwater heaters, deaerators, make up evaporators, special heat exchangers and associated equipment for central station and industrial power plants.

Every Marind job is backed by our international reputation for outstanding quality, service and performance. Write for a copy of our industrial products brochure.

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POWER • PROCESS
INDUSTRIAL EQUIPMENT

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Representatives in Principal Cities:

DETROIT, MICH., Bradbury-Kenrick Associates • PORTLAND, ORE., Charles E. Klaus Co. • PASADENA, CALIF., Dave B. Cole
CHICAGO, ILL., Piepenbrink Engineering Co. • YORK, PA., J. L. Souser & Associates • CLEVELAND, OHIO, Wagner-Green Co.
CINCINNATI, OHIO, Hare Equipment Co. • ATLANTA, GA., MIAMI, FLA., BIRMINGHAM, ALA., SUMTER, S. C., The Gearhart Co.
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ST. PAUL, MINN., Northwestern Power Equipment Co. • SANTURCE, PUERTO RICO, Ramon I. Gil

There's more in this barrel for you...

James P. Gavin, Socony Mobil engineer, (right) helps diagnose lubrication problem on a paper calender.

MORE PRACTICAL EXPERIENCE
to help you improve production and cut costs!

Specify Socony Mobil and you get the benefits of more *practical* lubrication experience than is offered by any other oil company.

Our representatives are long on experience—average well over 15 years of service. In addition, they can make use of our vast store of case histories and technical data amassed since 1866. All this practical knowledge and written experience is available to you to help improve your production and cut your manufacturing costs.

Socony Mobil products are also backed by *more* field engineers serving industry . . . *more* continuous research to assure continually improved products . . . *more* services for analyzing petroleum products in use . . . *more* on-the-job training of your personnel in correct product application . . . *more* approvals from machine builders.

* * *

Always specify Socony Mobil. There's *more* in every barrel for you!

SPECIFY **SOCONY MOBIL** FIRST STEP IN CUTTING COSTS

SOCONY MOBIL OIL CO., INC., and Affiliates: MAGNOLIA PETROLEUM COMPANY
GENERAL PETROLEUM CORPORATION

LUBRICANTS • FUELS • CUTTING FLUIDS • WAXES • SOLVENTS • PLASTICIZERS • PETROCHEMICALS

SPECIALLY BUILT

"Rhino"

LINE TRUCKS FOR 2-MAN CREWS!

This truck has a nose for work—work that conventional trucks can't really handle. The "Rhino" is specially built to take the rugged stress and strain from front-mounted derrick and digger with a live front axle rated at 9500 pounds—50% stronger than ordinary truck axles. The long, powerful front spring suspension is FWD-Engineered to take massive front end workloads.

2-MAN OPERATION
Saves Man-hours

The Rhino's front-mounted derrick and/or digger works out-front where the driver has a full view of the job being done. No need to jockey back and forth with extra men giving directions. Just drive into position where the No. 2 man guides the earth borer or swings the pole base into place. Two men do the work of five with better control, lower cost.

DIG MORE HOLES
Set More Poles... Travel Anywhere

The FWD "Rhino" does it all faster, cheaper! Load it down with equipment and move off to the job—fast and smoothly down the road, steadily and safely through the roughest off-highway terrain. You dig more holes, set more poles anywhere with the versatile and economical Four Wheel Drive "Rhino."

Send for illustrated "Rhino" folder for your equipment file. There is an FWD Utility Specialist near you who can give you the "Rhino" working profit and safety story without obligation. Call collect for his name.

THE FOUR WHEEL DRIVE AUTO COMPANY

TO TAKE HEAVY FRONT-END LOADS

OUTPERFORMS CONVENTIONAL OR CONVERSION TRUCKS!

The FWD "Rhino" is the only line truck built *to take* front-end workloads . . . with the driving front axle built 50% stronger than ordinary axles, with the special front spring suspension, and FWD's special alloy steel frame which has a 250% greater bending moment than competitive trucks.

This new Four Wheel Drive unit fits any front-mounted derrick or digger, any approved line body . . . giving you a line truck tailored to your line service requirements.

The FWD "Rhino" is specially designed to fit the rugged demands of utility line work . . . to help you cut down-time and repair costs.

For working economy, get the truck that's built to do many utility jobs faster, cheaper. Let the FWD "Rhino" help keep electric service today's best buy.

CLINTONVILLE, WISCONSIN • *Canadian Factory*, KITCHENER, ONTARIO

Hotpoint

Electric Water Heaters

With Performance and Features That Build Preferred Acceptance ... and Utility Revenue!

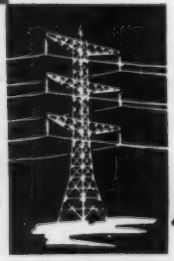
Almost *one-third* of the electric water heaters in use today were manufactured by Hotpoint—positive proof that Hotpoint has the acceptance that helps build *your* revenue!

Take advantage of this constantly growing preference. Promote Hotpoint Water Heaters . . . the *pre-sold* line that promotes acceptance through forceful national advertising . . . and helps *you* promote with a hard-hitting, *local* merchandising program designed specifically for utility use!

Learn all the facts about Hotpoint Automatic Electric Water Heaters from your local Hotpoint Distributor. He will be happy to help you build assured revenue for the future with Hotpoint.

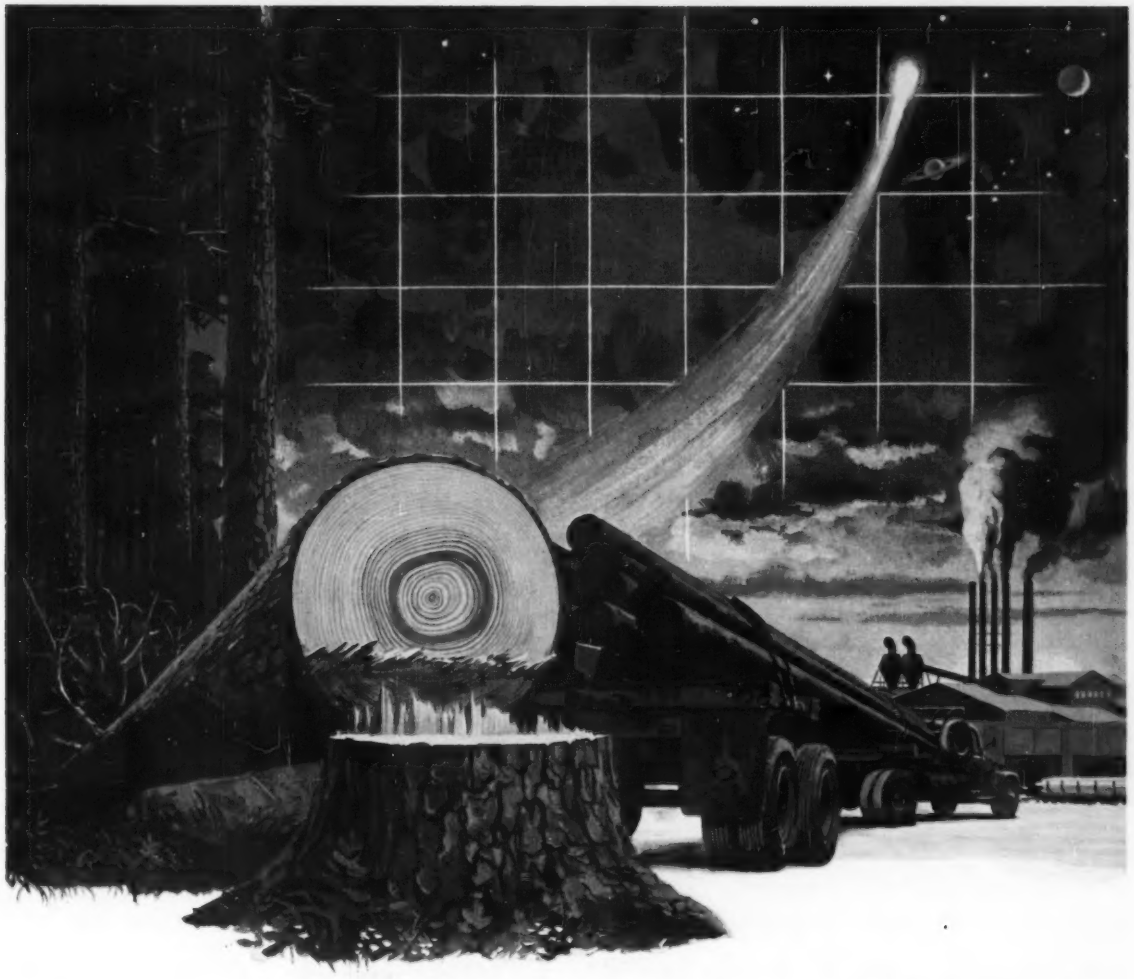
- **Hotpoint Water Heaters are available in a full range of sizes, in both round and table-top models.**
- **Famous Magic Circle® Heat—Calrod® heating units transmit heat to the water by conduction—the most direct and efficient method.**
- **New Low Prices—lowest in 10 years—help expand your electric water heater market!**
- **New Colortones—table-top models come in 5 colors as well as white!**
- **New Super-Speed—40-gallon quick-recovery models ready for shipment.**

Again, Hotpoint



looks at Tomorrow, Today!

HOTPOINT CO. *(A Division of General Electric Company)* **5600 West Taylor Street, Chicago 44, Illinois**



a major advance in pressure-treated pole production

by OLIN MATHIESON

Keyed to the soaring growth of America's public utilities, Olin Mathieson has now expanded its FROST pressure-treated pole operation to major proportions by the purchase of additional plant facilities.

The FROST operation of Olin Mathieson is managed as a modern, fully-integrated program — from vast forest reserves to pressure-treating facilities. Olin Mathieson's inflexibly high standards assure unexcelled quality in product and service.

Planning-in-depth, constant-cycle harvesting and high operating efficiency enable FROST to offer a complete selection of pressure-treated poles for prompt shipment to any destination. FROST efficiency stands ready to eliminate your planning and inventory problems.

Frost

FOREST PRODUCTS DIVISION

OLIN MATHIESON

CHEMICAL CORPORATION

SHREVEPORT, LOUISIANA

Savannah Electric and Power Reports:

TROUBLE-FREE COMMUNICATIONS FOR FOUR YEARS WITH GENERAL ELECTRIC TWO-WAY RADIO

For the past four years, the Savannah Electric and Power Company has depended upon trouble-free G-E two-way radio to coordinate maintenance, transmission, and construction crews throughout a five-county, fifty-mile city radius.

General P. E. Seawright, Superintendent of Transmission and Distribution for Savannah Electric and Power, reports his organization has never experienced a serious break in two-way radio communications, during four years of operation. He credits General Electric's dependable equipment, teamed with a maintenance program provided by the local General Electric Authorized Service Station, for assuring his firm of full 24-hour radio services.

Radio Cuts Service Loss Time

Seventeen mobile units in the fleet of service and supervisory vehicles are coordinated by radio from the office of General Seawright, in the Savannah office.

General Seawright credits the G-E two-way radio system for speedy assists in the restoration of service in emergencies. This is a vital factor to the thousands of homes and commercial installations over 1000 miles of line.

New Progress Line Radio

General Electric's new Progress Line radio provides full chassis, interchangeability, plug-in chassis, and new 6600 series tubes, specially designed and tested for radio communication circuits.

Your Communications Counselor can give you full details. Call him in, or, write: *General Electric Co., Communication Equipment, Section X1966-25, Electronics Park, Syracuse, N. Y.* In Canada, write: *C.G.E. Electronics, 830 Lansdowne Avenue, Toronto.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

ELECTRICAL BUSINESS OUTLOOK

Electrical World
JUNE 25, 1956

Chances are excellent that ample copper will be available at lower prices in coming months. There are two good reasons for arriving at this conclusion. Phelps Dodge Corp's new three-year contract with the Mine, Mill and Smelter Workers considerably lessens the chances of a damaging strike in the industry this summer. Without a strike, supplies will be more than ample. On the other hand, the downward trend in demand for the red metal continues while fabricators stocks keep climbing (in April they were 31% higher than last year). Under these conditions domestic producers will be hard put to stick to the 46¢ per pound price set earlier in the year when copper was short.

• • •

Electric utilities will generate 2,000 billion kwhr in 1975 predicts Philip Sporn, president of American Gas & Electric Corp. Taking out 250 billion kwhr for losses, sales in '75 will be spread this way (in billions of kwhr): Residential—545, commercial—250, industrial—900 and other—55. To achieve this level sales will have to jump 265% over 1955.

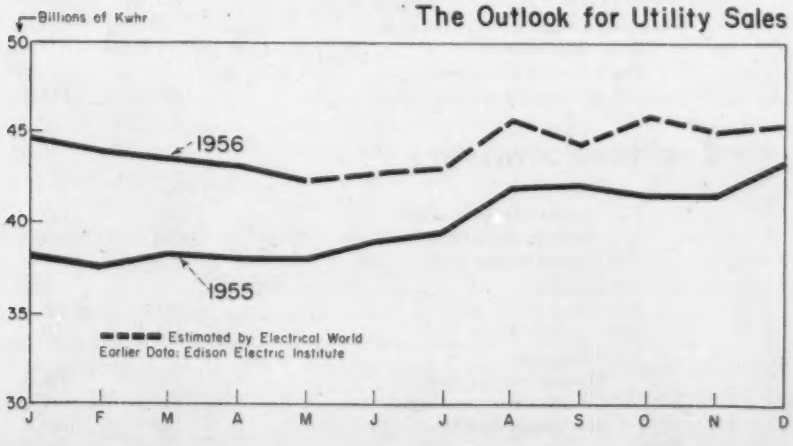
Average residential use will hit 10,000 kwhr in 1975 says Sporn. That's better than 3½ times the 2,755 kwhr consumed by the average residential customer last year. On the face of it, that's a healthy rate of growth. It's not that startling though when you consider that average residential use has more than quadrupled in the past two decades—and we have just entered the era of electric living.

Sporn sees about 20 million kw of nuclear generating capacity in the U. S. by 1975. Although this will represent only 5.2% of total installed capacity, it will account for 7.5% of total generation due to higher load factor expected for these plants. Hydro capacity will be 48 million kw—less than 13% of the total as compared to 22% in 1955. Water power will produce 250 billion kwhr or about 13% of total generation as against almost 21% in '55. Excluding hydro and nuclear plants, conventional fossil fuel stations will turn out 79.5% of the nation's kwhr needs in 1975.

• • •

Canadian generating capability is expected to increase 39.1% to 19.3 million kw in the next four years according to the latest power survey. This compares with EEI's forecast of a 33% growth in capability for U. S. utilities over the same period.

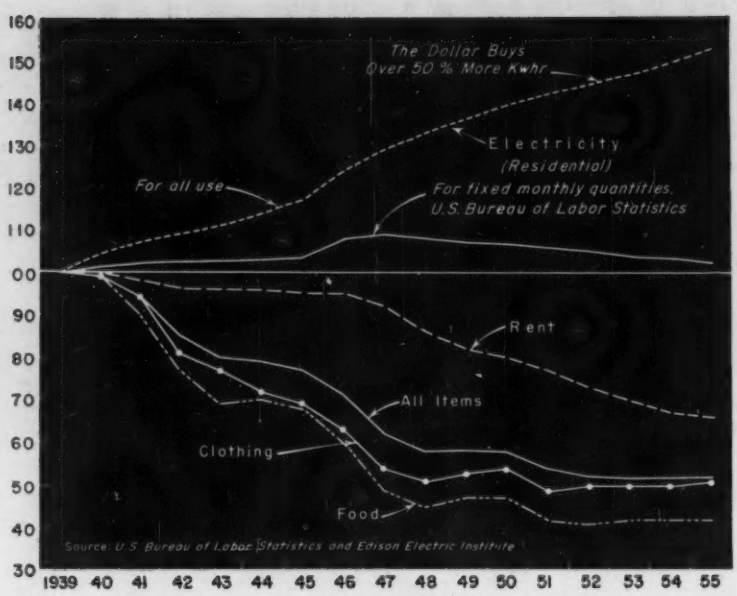
The Outlook for Utility Sales



STATISTICS

Purchasing Value of the Housekeeper's Dollar

(1939 = 100 cents)



Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	April	116.78	116.56	105.30	10.9
Peak—Class I Systems } million kw	Mar.	92.3	94.2	83.4	10.7
Estimated Dec. '56 Peak } million kw	Mar.	105.68	105.56	103.41	2.2
Production—billion kwhr	April	47.49	50.34	42.03	13.0
Hydro		11.55	11.78	10.46	10.4
Fuel		35.94	38.56	31.57	13.8
Sales—billion kwhr	Mar.	45.36	45.41	39.86	13.8
Residential		12.42	13.02	11.13	11.6
Commercial		6.84	6.89	6.20	10.2
Industrial		23.69	23.21	20.25	17.0
Other		2.40	2.28	2.28	5.3
Fuel Consumption	Mar.				
Coal—million tons		13.39	13.44	11.51	16.3
Oil—million barrels		6.22	7.10	6.81	−8.7
Gas—billion cu. ft		85.17	67.81	83.41	2.1
Net Income Class A & B Co's—$ million	Mar.	117.46	129.26	105.23	11.6
Residential Customers—millions	12 mos.	44.67	44.60	43.42	2.9
Revenue per kwhr	ended	2.63¢	2.63¢	2.68¢	−1.9
Avg kwhr per customer	Mar. 31	2,819	2,799	2,607	+8.1
Avg annual bill		$74.12	$73.67	$69.87	6.1

Business Statistics . . .

Indexes: 1947–49=100					
FRB Industrial Production	April	143	143	138	3.6
ENR Construction Cost	May	144.4	143.2	137	5.4
BLS Cost-of-living	Mar.	114.7	114.6	114.3	0.4
NEMA Sales	April				
Insulation materials		163	168	160	1.9
Electric appliances		111	120	102	8.8
Wholesale prices	Mar.				
Motors and generators		126.9	126.6	120.5	5.3
Transformers and regulators		133.1	131.2	127.3	4.6
Switchgear and fuses		147.8	147.5	135.5	9.1
GNP—annual rate—$ billion	1st Qtr.	398.5	397.3	375.3	6.2

Your Business

"Never mind, I've got it fixed."

The weather, like politics, is everybody's business. It affects our personal outlook, our habits, and our daily work. As a topic of conversation, weather is near the top. Just about anyone is willing to pay for a couple of extra minutes of long distance telephone time to exchange weather observations. To raise the general level of all this conversation about the weather, our ever-dependable economics department has conducted a bit of research and come up with some observations of its own:

What's happening to the weather? The succinct answer to that one is "Something different all the time," for the weather is defined as conditions of temperature, wind velocity, precipitation which we experience from day to day. But when we talk about "climate," defined as the average weather condition at a place over a period of years, the answer is different. For while the weather is continually changing, the U. S. Weather Bureau maintains that the climate is pretty much the same over a period of years. At least there is not a distinct trend one way or the other. Recent winters, for instance, have run both warmer and colder than normal—with 1940, 1943, 1947 and the recent winter on the cold side.

On the contrary, the climate is becoming warmer maintains Meteorologist G. H. T. Kimble. In his book "Our American Weather," published by McGraw-Hill, Kimble notes that sub-zero temperatures in Montreal are only half as common as they were at the end of the 19th century. He also notes that the mean winter temperature of Boston has risen 3.5 degrees F, and the average snowfall in New England is about 25% less than in the 1880's. These bits of evidence, and the changing habits of the tufted titmouse and the turkey vulture in coming much farther north than when first observed, lead Kimble to suggest that the climate is getting milder.

For pure conversation, the weather forecasts of the Farmers Almanac can't be beat. The last six days of June, says the Almanac, will be "Hot, by jingo, in anybody's lingo." For the first three days in July, there is the ominous warning, "Flood of mud." Early August, "Sticky and ticky."

Your Health—Does Your Big Toe Hurt?

Rex H. Wilson, MD, Medical Director, B. F. Goodrich Co

Do you have sudden attacks of painful swelling and redness of one or more of your joints? If so, you may have gout, especially so if the middle joint of one of your large toes is affected.

Rich, fancy foods and excessive drinking of alcoholic beverages have been accused of being the cause. It is probably the result of the body organs not using certain protein food substances properly. It commonly occurs in men over 30 years of age. The tendency to have gout appears to be inherited rather than acquired.

Eventually persons with gout develop small crystalline deposits called "tophi" in and about the affected joints and in other parts of the body. The ear margins and the kidneys are frequently invaded. As gout progresses, the destructive joint changes can be seen on X-rays.

Your physician can prescribe several effective medicines for the treatment of gout. At first he may suggest aspirin and hot or cold moist compresses. He may order drugs such as colchicine, the cortisone drugs, ACTH and phenylbutazone for you. Sometimes it is necessary to inject hydrocortisone into the joint for relief.

Many physicians find that benemid is of particular value in the chronic case. Diet is important. You should avoid eating foods such as liver, kidneys, brains, sweetbreads, anchovies and sardines. You should eat sparingly of bacon, beef, tongue, codfish, duck, goose, game birds, halibut, lamb, meat soups, perch, pike, rabbit, shellfish, squab, trout, turkey, veal and venison. Alcohol should be used sparingly or not at all. Absolute bed rest is a must during the acute attacks.

A middle-aged man who has a family history of gout should eat and drink moderately. It is not the gourmet or glutton who gets gout, it is the man with the "gouty" ancestor.

WASHINGTON COMMENT

What Would the Democrats Do?

Their success would mean a stepped-up federal power program. Party's Natural Resources Advisory Committee makes plans for the future

V. CRAIG RICHTER, Washington Correspondent

Any illusion that the electric utility industry may have had about being no worse off under a Democratic Administration than the present Republican Administration must be dispelled by recent developments.

It is clear now that the growth of federal power development will be pushed with determination and eagerness by a Democratic Administration. In fact, on the basis of the evidence given out to date, it seems safe to say that what would happen under any such Administration would make the events of the Roosevelt and Truman Administrations look like a "pink tea party."

There is the recent formation by the Democratic Party of a special Advisory Committee on Natural Resources to draft policy in this field, specifically electric power. And at this stage it appears that the committee will devote more of its efforts to drafting power policy than to any other of the fields it is supposed to cover.

In charge of the new group is Oscar Chapman, Truman's Secretary of the Interior, whose zeal in trying to put the federal government into the electric power business is still giving the industry headaches today. His efforts to have federal government development of the Hells Canyon project are an example. However, his designs on Roanoke Rapids have been successfully blocked.

But together with the other former Truman appointees, and supported by a number of vigorous federal power advocates in the present Congress. Chapman is busy drawing up a program for federal power development of real magnitude.

Chapman committee approach goes beyond that of simple flood-control-multi-purpose-project approach. It starts out with the thesis that federal government has a responsibility to supply power.

The committee gives several reasons for this position. It conveniently argues that the power industry is failing and will continue to fail to meet the growing power needs of the country. Therefore, the federal government must provide the spur, the leadership, by becoming a generator and supplier of power. To this it adds the familiar cliches of "yardstick," and what is contends is ineffectual state regulation. The most effective regulation, the committee says, is competition, and the government must provide it.

Furthermore, the thesis of government responsibility automatically gives the green light to steam power plants and nuclear power plants. And these the committee definitely sees as part of the government power picture.

If the committee needed an excuse for the policies it proposes, it has been provided with the necessary 'handbook" as it has been described by Republican members of Congress. This is the Chudoff Committee report. The question of which came first, the Chapman committee policy or the Chudoff report, is like that of the chicken and the egg.

TECHNICAL NOTES

Epoxy resins give 500 v per mil dielectric strength and ½ Megohm resistance when used to encapsulate small electrical components. Tensile strength ranges 8,000 to 13,000 psi, and moisture absorption is downward from 0.1%.

Chemical industry of the future may see compounds transformed by radiation instead of heat and pressure.

Holding strength of strain clamps for aluminum conductors is difficult to rate. It is affected by such variables as type and condition of conductor, sequence of tightening clamping bolts, and the tightening torque.

Safe grounding of conductors on a line pole without a multi-grounded neutral can be accomplished by connecting neutral and phase conductors to a pole band installed below the working space.

Corrosion of aluminum has been inhibited successfully for 25 years with three different compounds: A penetrating cut back of coal tar, a petroleum grease containing aluminum stearate, and a petroleum wax. The cut back penetrates old, untreated fittings and conductors to arrest progressive corrosion.

Radiation damage cuts electrical conductivity, thermal conductivity, and density.

SIEMENS

OIL-FILLED CABLES

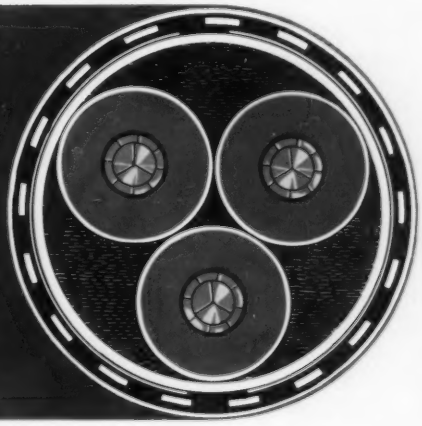
30 to 380 kV

Over 1,000 kilometres

of single-core and three-core oil-filled cables have been supplied to many different countries for laying on the land and under the sea.

From 30 kV upwards oil-filled cables offer important economic advantages.

Argentina
Austria
Finland
Germany
Holland
Norway
Pakistan
Poland
Portugal
Spain
Sweden
Switzerland
Turkey
Uruguay



688

SIEMENS-SCHUCKERTWERKE AKTIENGESELLSCHAFT

BERLIN · ERLANGEN

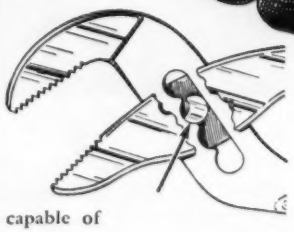
SOMETHING NEW!

30% THINNER
TWICE AS STRONG
GRIPS LIKE A PIPE WRENCH

CLEAN, SHARP TEETH
FLUSH RIVET NO PROJECTIONS
BOX JOINT ADJUSTABLE TO 4 POSITIONS UP TO 1½" CAPACITY
EXTRA THIN—ONLY ½" AT THICKEST POINT
NON-SLIP CHECKERDOT KNURLING
CRESCENT TOOL CO. JAMESTOWN, N.Y.
P-210
PATENT PEN

Crescent's No. P210 Utility Plier is completely new ... revolutionary! It's not a "slip-joint" plier and not to be confused with conventional lap-joint "pump" pliers. Its *double-strong* box joint design is absolutely unique and assures a powerful grip like that of a pipe wrench without sideways twist or strain. It will grip flat, square, hex or round objects with powerful leverage.

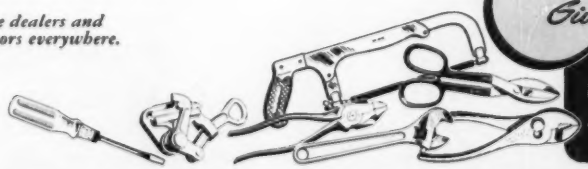
QUICK, POSITIVE ADJUSTMENT



This cut-away view shows joint construction with its extra generous bearing surface at the arrow point. Adjustment is made by simply "walking" the rivet recess over the bearing point with a pumping action of the handles. Easy, positive, capable of heavy loads.

Handsomely finished in rust-resistant zinc plate. Overall length 9½ inches.

Sold by hardware dealers and industrial distributors everywhere.



CRESCENT TOOLS
Give Wings to Work
®
Sign of the Artisan
Symbol of Excellence

Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

NEW VERMILION STATION
near Danville, Illinois, was designed by Sargent & Lundy. 75,000-kw Unit 1 went on the line in May 1955. 100,000-kw Unit 2 goes in service October 1956.

ILLINOIS POWER EXPANDS AGAIN!

Latest 175,000-kw station is protected by Permutit-conditioned water

To meet rapidly growing needs, progressive Illinois Power Company has built two high-pressure stations within two years.

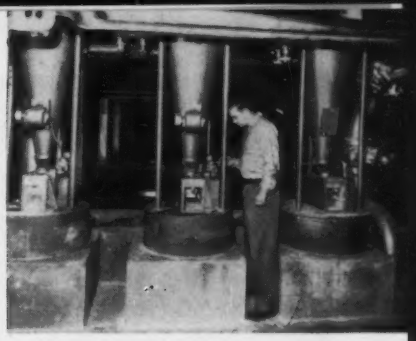
75,000-kw Hennepin Station went on the line in 1954. Its 1450 psig boiler requires *feedwater of the highest quality*. To produce this makeup, Permutit Demineralizers were installed.

When Illinois Power built the new Vermilion Station, Permutit water conditioning was installed again. To protect its turbine and boiler, all makeup is demineralized by the Permutit ion exchangers shown.

For Vermilion's big cooling-tower system, a different grade of water is most economical. The Permutit Precipitator and Filters shown produce it.

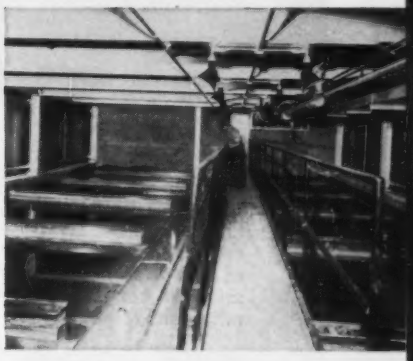
You can get this complete protection for your plant. We'll gladly help. Write outlining your problem. The Permutit Company, Dept.EW-6,330 West 42nd Street, New York 36, N. Y. Permutit Co. of Canada, Ltd., 207 Queen's Quay, Toronto 1, Ont.

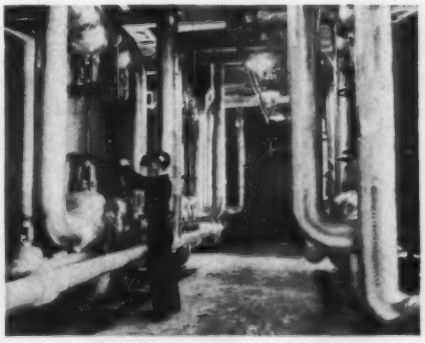
PERMUTIT®
WATER CONDITIONING
Equipment • Resins • Experience



Chemical Feeders: 1st step in treating all water for plant use is accurate dosages of lime and alum for treatment in Precipitator.

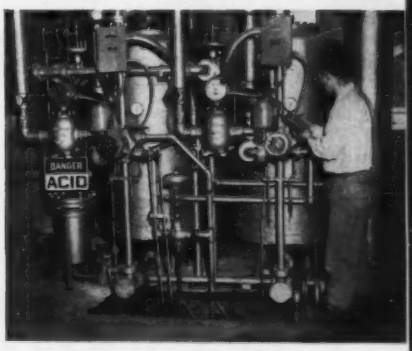
1800 gpm Precipitator clarifies and softens cold river water. Dealkalizes, too—eliminating need for degasifier in demineralization.





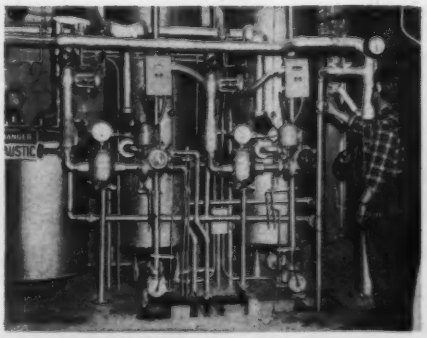
Pressure Filters further clarify Precipitator effluent . . . deliver finished water to protect Vermilion Station's 53,000 gpm cooling-tower system.

Anion Exchangers: Permutit S resin removes the few remaining minerals . . . protects Vermilion Station's turbine from troublesome silica deposits.



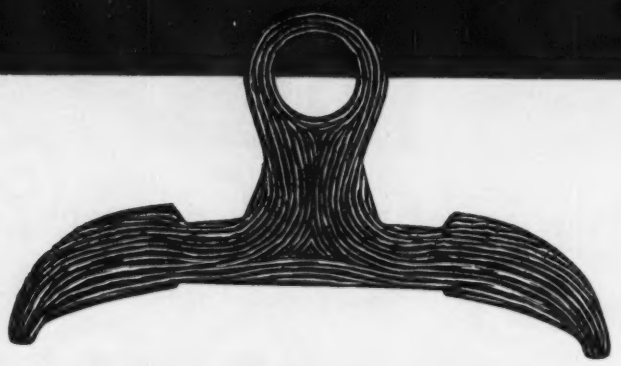
Cation Exchangers: Permutit Q resin removes metallic cations from Precipitator effluent to prevent boiler scale . . . allow high heat-transfer rates.

Control Cubicle operates demineralizers. Determines end-point, then sequences backwashing, regeneration, rinsing, return to service. Even prepares regenerant charges.



DROP FORGING makes

See the difference Drop-Forging makes



BTC FORGED CLAMP
Fibrous grain structure of metal conforms with shape of clamp . . . making clamp stronger, tougher, and permits lightweight design.

CAST CLAMP
Metal has no fibrous structure. Lower yield and tensile strengths . . . heavier sections necessary in critical areas . . . has undesirable mass.

BTC SUSPENSION CLAMPS are recommended for application on all transmission line conductors in general use. Because they are drop-forged, they develop uniformly high strength, more than adequate for field service.

Heavy sections or reinforcing ribs . . . necessary in other materials to develop desired strength and prevent collapse or breakage of the clamp under clamping U-Bolt pressure . . . are not required in these clamps. As a result, undesirable weight is eliminated without sacrificing strength.

BTC conductor suspension clamps better

6200A SERIES
Steel Suspension Clamps. Drop-forged steel, hot-dip galvanized, suitable for all conductors.

9500 SERIES
M.P.L. (Minimum Power Loss) Aluminum Suspension Clamps. Drop-forged, heat-treated Aluminum Alloy Clamps for A.C.S.R. and All-Aluminum Conductors.

The light weight and generous longitudinal radius of the conductor seat minimize the effects of conductor vibration. The conductor is not bent over a small radius at any point. Clamping pressure is greatest at the center, gradually decreasing toward each upswept end of the keeper. Clamp and keeper ends are liberally bell mouthed and beaded to prevent conductor damage and formation of corona.

The conductor is fully supported in the BTC clamp body. There are no open pockets at U-Bolt holes to allow distortion of the conductor under clamping pressure. The clamp's superior strength insures against failure under severe loading, while its greater hardness prevents excessive wear at points in contact with the supporting pin.

The close-grained, non-porous structure of the forged clamp body effectively prevents the destructive internal seepage of corrosive elements . . . a cause of failure in some transmission line fittings produced by other processes.

You will find exactly the right clamp for your conductor in BTC's complete line of Drop-Forged Suspension Clamps. No bore size allowance for manufacturing variations is necessary due to the close dimensional fidelity of the die-forged and die-formed parts.

Specify **BTC** **DROP-FORGED Hi-Line Hardware**

. . . From Your Insulator Manufacturer

The BREWER-TITCHENER CORPORATION, Cortland, N. Y.

New! Rugged Heavy-Duty Public Utility Truck

INTERNATIONAL
Four-Wheel-Drive
Model S-164 (4x4)

GVW—18,000 lbs.

Wheelbases—130", 142", 154", 172"

Engine—INTERNATIONAL 264 cu. in. Black Diamond

Front Axle—7,000 lbs. capacity

Rear Axle—14,500 lbs. capacity

Transmission—4-speed

Hauls bigger loads, anywhere!

Here is a new four-wheel-drive INTERNATIONAL truck with a whopping big 18,000 lb. GVW rating . . . with sure-footed traction and extra power to go over the most rugged terrain.

This new "field and road" four-wheel-drive unit is especially built with generous size components for on- and off-highway operations. For example—husky frame has full load-length reinforcements that extend beyond the front spring, front-mounting brackets. Heavy-duty front-end construction permits the installation of A-frame for setting poles or mounting hole digger. Roomy Comfo-Vision cab is built to endure the twists and strains of this rugged operation.

For auxiliary power, *both* front and rear power take-offs are available, including the exclusive INTERNATIONAL full-torque type on the transfer case. You can even pull a fully loaded pole trailer with this INTERNATIONAL "work horse."

On good roads, front axle is disengaged. You have the driving ease, comfort and convenience of a conventional truck. Why not investigate the profit-possibilities of this new S-164 (4x4) on your operation? Contact your INTERNATIONAL Dealer or Branch for all the details.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

World's most complete line of Public Utility Trucks

Six factory-built all-wheel-drive models—7,000 to 26,000 lbs. GVW. Conventional and COE, 4- and 6-wheel models—4,200 to 90,000 lbs. GVW. Whatever your transportation needs, there's an all-truck built INTERNATIONAL that will stay on your job longer, at less cost.

INTERNATIONAL TRUCKS

All-Truck Built to save you the BIG money!

Motor Trucks • Crawler Tractors • Construction Equipment
McCormick® Farm Equipment and Farmall® Tractors

Insulators out of every finished batch are given this impact test, which checks the mechanical strength and density of the porcelain. Height from which hammer arm drops measures the amount of impact the porcelain will stand.

A corner of Illinois' new large laboratory. Here ceramic engineers test incoming materials, develop new ideas for improved production methods, and test products at various stages during and after production, to assure you dependable finished porcelain.

All Illinois pin-type insulators are given a 100% high voltage flashover test in this test equipment. Voltage builds up until it flashes over, or through, the insulator. If it flashes through, the insulator is, of course, rejected.

Here's a pin-type insulator that failed. This insulator was broken apart to show how the high voltage current searches out even microscopic cracks, like those indicated by the scorched lines at the top. A reject, of course.

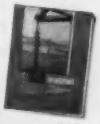
Illinois Electric Porcelain is TRIPLE-TESTED . . . and more!

Illinois Electric Porcelain insulators are triple tested to assure the customer that he gets the highest possible quality in electrical porcelain.

Triple-testing is done (1) of incoming materials, in the laboratory; (2) during production, through our extensive quality-control system; and (3) after completion of production, before insulators are shipped, by rigid final testing. Some tests are 100%, like the "M & E" and electrical flashover tests; some are spot checks to destruction, like the impact test and over-voltage pull tests, in which strain insulators are pulled apart while under electrical and mechanical tension, to see how much pull they will take.

Today Illinois Electric Porcelain is producing high quality products with the latest precision production equipment. Illinois' laboratory provides extensive facilities for checking materials and processes, and for devising even more rigorous checks of final production. Galvanizing is done in Illinois' own completely modern galvanizing plant.

The result is that you can depend on Illinois for the highest quality product. Ask the L-M Field Engineer who calls on you for information and copy of Porcelain Bulletin DL8; or write Line Material Company, Milwaukee 1, Wisconsin.



ILLINOIS ELECTRIC PORCELAIN COMPANY

(a McGraw Electric Company Subsidiary) Macomb, Illinois

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Distributed by **LINE MATERIAL**

Electrical Porcelain Insulators

(a McGraw Electric Company Division)

L-M's secondary capacitors are small, light, and very easy to install.

L-M Secondary Capacitors Improve Overloaded Distribution System

L-M offers complete line of secondary capacitors as an economical means to increase load capacity, reduce load losses, and improve voltage level of secondary system.

By **N. K. DELANEY**
Product Manager
Capacitors and Regulators
Line Material Company

The effectiveness and economic worth of secondary capacitors have increased considerably because of the heavy load growth from motored appliances. Many residential secondary systems have been forced to operate with loads having as low as 70-percent power factor.

Advantages of Secondary Capacitors

By improving the power factor in the secondary circuit, secondary capacitors can provide the same benefits as obtained by installing larger distribution transformers, heavier secondary conductors, or voltage regulators, and can do this at appreciably less handling and installation costs. This comparison, of course, must be within the range obtainable by power factor correction.

Transformer Capacity Increased

The maximum benefit from secondary capacitors is obtained at the most advantageous period, which is during peak-load conditions. The chart, Fig. 1, shows the decrease in transformer loading obtained by adding capacitors to the transformer secondary, and Fig. 2 shows the recommended number of capacitor units with various transformer ratings.

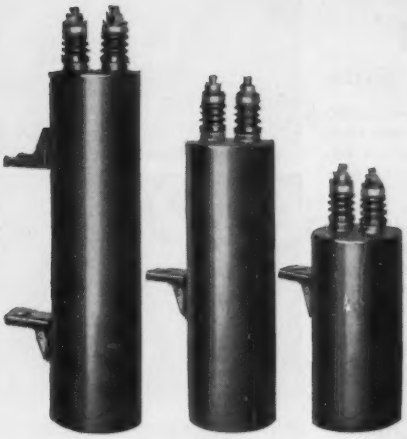
Load-Loss Reduction

The combination of transformer and secondary capacitor is more efficient than a transformer large enough to carry the load. The secondary capacitor, by increasing the power factor of the load, reduces the amount of current that has to flow through the transformer and secondary conductors.

Voltage Improvement

The value of voltage improvement with secondary capacitors is equal to the same amount of fixed primary kvar, *plus* the voltage rise through the distribution transformer and affected secondary.

LM®
LINE MATERIAL
A McGRAW ELECTRIC COMPANY DIVISION



L-M 240 volt secondary pole-mounted capacitors are available in 7½, 5, and 3 kvar ratings. See chart for height and weight.

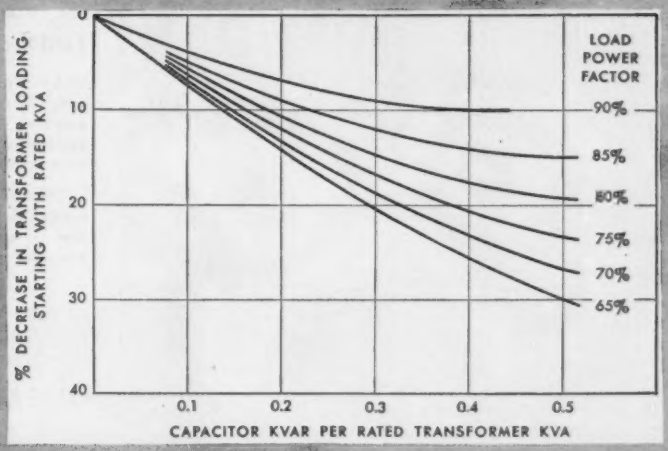
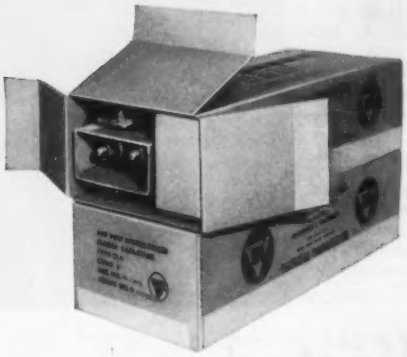


FIG. 1—These curves show how you can decrease transformer loading—at various power factors—by adding secondary capacitors.



L-M's unique carton permits easy testing of capacitors without removing them from the carton.

Distribution Transformer Rating in KVA	Recommended Number of Capacitor Units			
	3 KVAR	5 KVAR	7½ KVAR	10 KVAR
10	1	—	—	—
15	2	1	—	—
25	3	2	1	1
37½	4	3	2	1
50	6	4	2	2
75	9	5	3	3

FIG. 2—The above chart shows the recommended number of secondary capacitor units with various transformer ratings.

Capacitor Location

To obtain the maximum benefit, capacitors should be installed in pairs, located from ⅔ to ¾ the distance to the end of the secondary, in each direction. This recommendation is based on a reasonably uniform load distribution and secondary conductors in two directions from the transformer.

L-M Offers Complete Line Of Capacitor Equipments

L-M's 240V. secondary pole-mounted capacitors are available in 3, 5, and 7½ kvar. 10 kvar's will be available soon.

L-M's 216-volt, 13⅓ kvar submersible capacitors are available in 40, 80, and 120 kvar racks, completely assembled at the factory ready for field installation.

L-M's complete line of primary capacitor equipments includes pole-mounted, single and multi-row racks, factory-assembled blocks and metal-enclosed equipments. Most capacitor equipments are available in 2400- to 13,800-volt; 25 or 50 kvar capacitor units.

Some Outstanding Features Of L-M's Pole-Mounted Secondary Capacitors

Leads of 48-inch, 600-volt wire furnished as standard equipment.

Bushing-Mounted Indicating Fuse with 48-inch lead can be supplied.

Solder-Sealed Bushings of strong one-piece wet-process porcelain provide a positive, lasting seal.

Pole-Mounting Bracket has two 9/16″ holes for ½″ lag screws. Standard EEI-NEMA crossarm-mounting bracket furnished if required. Capacitor can be mounted with bushings up or down.

Aluminum Metallizing process protects steel tank from oxidation; is followed by a chromate primer and a finish coat of alkyd resin paint.

Round-Pack, Round-Tank Design makes these capacitors small, light, easy to install. Unit has a one-minute discharge resistor; is completely impregnated under vacuum with low temperature Elemex liquid dielectric.

Weight and height of L-M's 240-volt, pole-mounted secondary capacitors.

Size Kvar	Height Inches	Net Weight* Pounds
3	13¾	18
5	18⅝	25
7½	23½	33
10	Available Soon	

**Weights include the pole-mounted brackets.*

Get The Whole Story On L-M's Capacitor Equipments

Ask the L-M Field Engineer for complete information and bulletins on the construction and application of L-M's full line of primary and secondary capacitor equipments. Also on L-M's capacitor bank engineering service. Or write Line Material Company, Milwaukee 1, Wisconsin.

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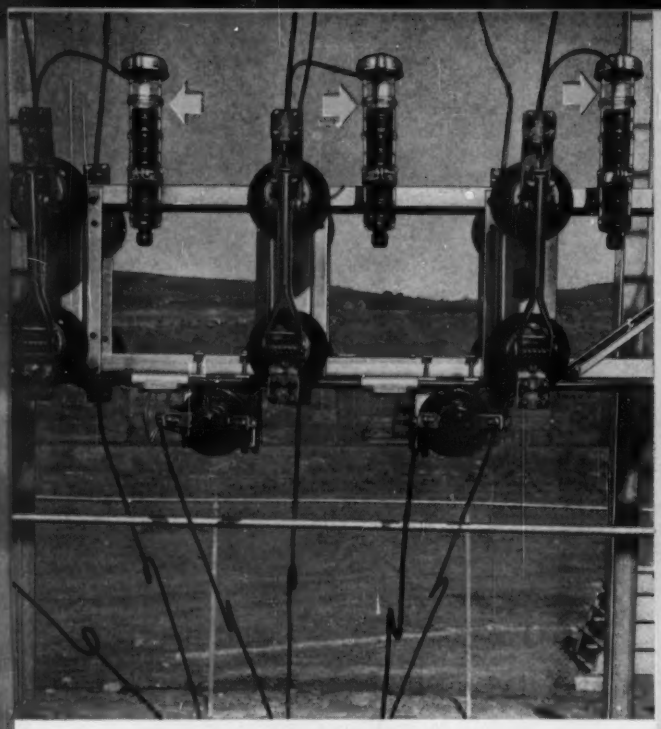
Elemex Capacitors



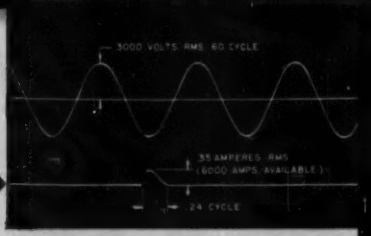
Valve arresters are not limited by the available short circuit current. They operate equally well with very high or very low available follow current.

VALVE ARRESTERS HANDLE

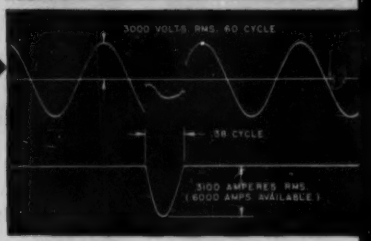
HIGH

FAULT CURRENTS BETTER

VALVE Type Arrester, on a 3000 volt, 60-cycle system, with 6000 amperes available, draws 60-cycle power follow current of only 35 amperes RMS.



EXPULSION Arrester, on the same system, draws 3100 amperes follow current—over one-half the available short-circuit current.

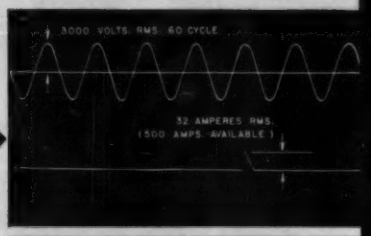


VALVE ARRESTERS HANDLE

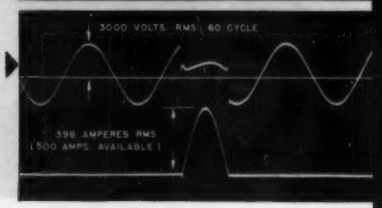
LOW

FAULT CURRENTS BETTER

VALVE Type Arrester, on a 3000 volt, 60-cycle system with 500 amperes available, draws only 32 amperes, as shown in this oscillogram. And it interrupts the follow current in a half-cycle, or less.



EXPULSION Arrester, on the same system, draws 398 amperes. An eroded expulsion arrester may not develop enough pressure to clear the arc—and a sectionalizing device would operate unnecessarily.



Valve Arresters Are Not Affected By System Capacity...

Another reason why valve arresters are better than expulsion arresters

by **RALPH H. EARLE**
Manager of Engineering
General Products
Line Material Company

One of the major advantages of valve arresters is that they work equally well at the bus of the largest generator made, or at the most remote point on a rural line.

This is not true of expulsion arresters. With high fault current they pass far more power follow current, which results in rapid erosion of the expulsion tube and comparatively short life.

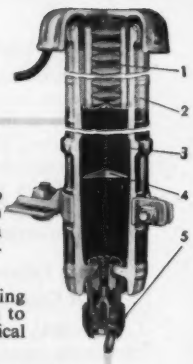
With low fault currents, an expulsion arrester may take several cycles to interrupt follow current. A badly eroded expulsion arrester may not work at all, thus blowing the sectionalizing fuse or causing unnecessary recloser operation.

The four principal reasons why we recommend valve type arresters over expulsion arresters are: valve arresters have better protective characteristics, unlimited 60-cycle capacity, no fuse coordination problems, and longer life.

Get Complete Information

Details of some of the extensive evidence in favor of valve over expulsion arresters are given in a new booklet, "The Theoretical and Practical Aspects of Lightning Protection on Distribution Systems." Whichever type you use, we believe you'll be interested in this report. Ask your L-M Field Engineer for a copy, or write Line Material Company, Milwaukee, 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

Features of L-M's Valve Arrester



1. The ladder spark gap is designed to provide an optimum balance between 60-cycle sparkover and impulse sparkover.

2. The Pyrex glass housing permits visual inspection to detect mechanical or electrical damage.

3. "Granulon," the valve material, is able to withstand severe heating which accompanies heavy strokes of lightning.

4. Lens-shaped electrodes in the element compensate for "skin effect," assuring uniform distribution of surge current throughout the valve element.

5. L-M's exclusive "Isolator" gives positive assurance against grounding feeders by instantly disconnecting the ground lead from the arrester if the arrester should ever become damaged.

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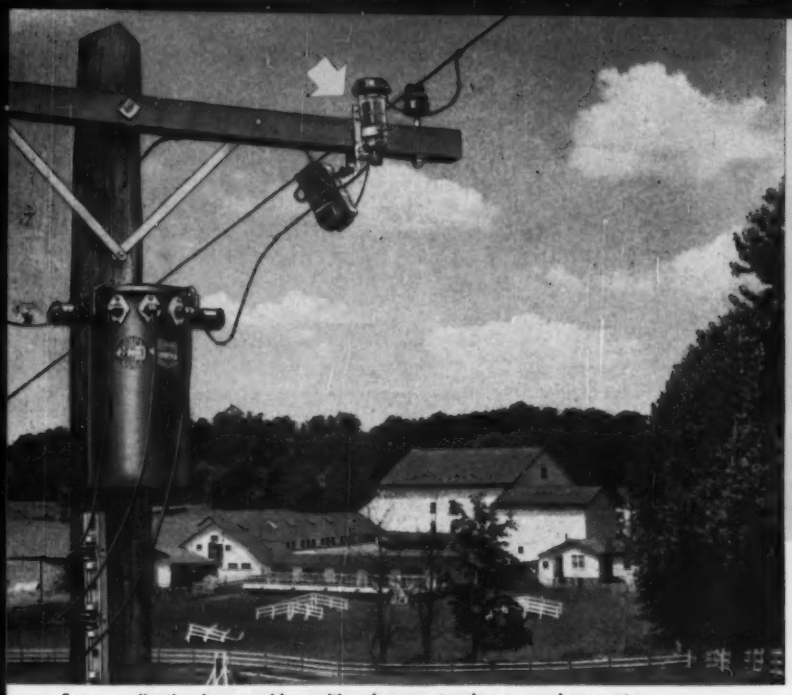
LINE MATERIAL Lightning Arresters

A McGRAW ELECTRIC COMPANY DIVISION



Fuse coordination is no problem with valve arresters because valve arresters pass very small values of follow current, regardless of system capacity.

Valve Arresters Permit Better Fuse Coordination

. . . Another Reason Why Valve Arresters Are Better Than Expulsion Arresters

by **H. V. DRYER**
Chief Engineer
Protective Products
Line Material Company

When you compare the operations of valve and expulsion arresters, you will see why there are so many fuse outages following a lightning storm on lines with expulsion arresters. And why, although we make both types, we at L-M say that *valve arresters are better than expulsion arresters.*

Expulsion Arresters

The oscillograms at right above show typical examples of power follow current through a valve and an expulsion arrester. With the expulsion arrester in this case, all sectionalizing fuse links must be able to handle 3100 amperes for at least a half cycle. Such fusing gives reduced short-circuit protection and greatly increases the problem of fuse coordination.

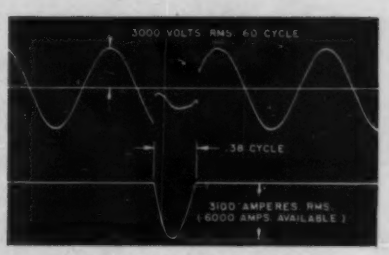
In addition, the magnitude of power follow current passed by an expulsion arrester will continue to increase because the fibre expulsion tube erodes as the result of each operation. This could eventually cause fuses to blow every time the expulsion arrester operates.

Valve Arresters

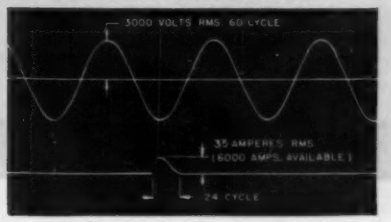
Fuse coordination is no problem with valve arresters, because they pass only relatively small values of follow current regardless of the system capacity. This is true for the life of the arrester.

Get Complete Information

Details of some of the extensive evidence in favor of valve over expulsion arresters are given in a new booklet, "The Theoretical and Practical Aspects of Lightning Protection on Distribution Systems." Whichever type you use, we believe you'll be interested in this report. Ask your L-M Field Engineer for a copy, or write Line Material Company, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

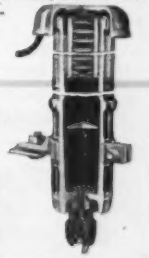


3 KV EXPULSION ARRESTER



3 KV VALVE ARRESTER

The oscillograms show the operation of typical expulsion and valve arresters handling a lightning discharge with 6000 amperes fault current available. The expulsion arrester, top, draws 3100 amperes follow current; the valve arrester, bottom, draws only 35 amperes. If expulsion arresters are used, all sectionalizing fuses must be heavy enough to handle 3100 amperes for at least a half cycle. However, if valve arresters are used, much smaller fuses can be installed, and coordination poses no problem.



FOUR PRINCIPAL REASONS for recommending valve over expulsion type arresters

1. Better Protective Characteristics—The valve arrester sparks over more quickly and at lower voltages on lightning surges. Transformer end turns are not stressed by a complete voltage collapse following sparkover. Although the expulsion arrester provides a satisfactory level of protection for most transformers, a higher degree of protection is available through the proper application of valve arresters.

2. Unlimited 60-Cycle Capacity—The application of the valve arrester is not limited by the available short-circuit current. The expulsion arrester, operating on a pressure principle, has a definite top limit and may have a bottom short-circuit current rating. (Too much current causes it to explode; too little fails to expel the arc.)

3. No Fuse Coordination Problems—The valve arrester will pass relatively small values of 60-cycle follow current, regardless of system capacity. Expulsion arresters can pass high follow current which may cause unnecessary operations of sectionalizing devices.

4. Longer Life—The valve arrester is electrically and mechanically unaffected in handling lightning discharges usually encountered in service. Its life is relatively unlimited. The expulsion arrester ages and changes its characteristics, because the fibre is affected by both atmospheric conditions and erosion caused by operation.

LINE MATERIAL
A McGRAW ELECTRIC COMPANY DIVISION

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LM Lightning Arresters

"... this program will do a tremendous job"

"I personally believe that the Live Better Elecrically program is going to increase the over-all interest of the public in the benefits our industry has to offer. This unquestionably will stimulate the sale of appliances and load growth."

Walter McKie,
General Sales Manager,
Rochester Gas and Electric Corporation

How Rochester Gas and Electric is building with LIVE BETTER...

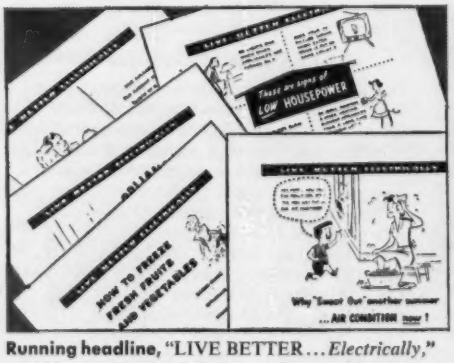
Today over 300 electric utilities throughout the country are actively participating in the LIVE BETTER... *Electrically* program. Here's how one combination utility—Rochester Gas and Electric—is using this long-range, industry-wide promotion to get maximum results for its own residential load-building efforts.

Every electrical promotional activity at RG&E is being launched under the banner of "LIVE BETTER . . . *Electrically*." This theme dominates and unifies RG&E's dealer program, Housepower program, home-appliance program, farm program, architects and builders promotion, home-economics program, model-home promotion, advertising, and Electrical Association activity.

Important to the success of this far-flung activity is the liberal use made of promotional materials available from LIVE BETTER . . . *Electrically*. RG&E is distributing copies of the 72-page consumer idea book. sending copies of "How to Help Home Owners LIVE BETTER . . . *Electrically*" to its trade allies, using banners, streamers, counter cards, mats with the slogan and emblem.

These materials are available to every electric utility in America. The impact of national LIVE BETTER... *Electrically* consumer advertising in magazines and network television shows, plus industry-wide trade advertising, helps insure the success of this cooperative effort. Those utilities—like Rochester Gas and Electric—which are working for and getting the cooperation of trade allies in their area will reap the greatest rewards.

Consumer idea book, "New Step-by-Step Ideas to help you LIVE BETTER . . . *Electrically*," will be offered in RG&E's editorial-style advertisements to run in local newspapers.


These are signs of LOW HOUSEPOWER
HOW TO FREEZE FRESH FRUITS AND VEGETABLES
Why "Sweat Out" another summer ... AIR CONDITION now!

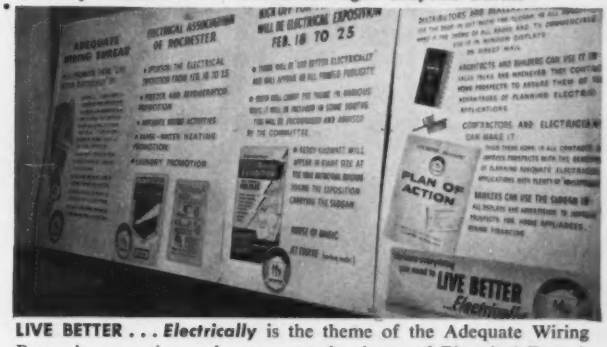
Running headline, "LIVE BETTER... *Electrically*," provides an "umbrella" theme for pending newspaper advertisements of The Electrical Association of Rochester, Inc. These advertisements will appear every week for 50 weeks.

Home economists in the Home Economics & Lighting Dept.—like Miss Marcia Dowd – tell women's groups of the many ways they can LIVE BETTER . . . *Electrically*.

residential load *Electrically*

LIVE BETTER ELECTRICALLY

Broad scope of RG&E's load-building program and its liberal use of the LIVE BETTER . . . *Electrically* theme and materials are indicated by Assistant General Sales Manager Graydon Curtis.



LIVE BETTER . . . *Electrically* is the theme of the Adequate Wiring Bureau's promotion and appears as the theme of Electrical Exposition. Poster shows how RG&E works with dealers and distributors.

Home-modernizing promotion, of particular interest to architects and builders. This activity, as well as the RG&E Farm Department program, will tie in with the LIVE BETTER . . . *Electrically* campaign.

Appliance exhibits, featuring high-wattage appliances like washers, dryers, automatic water heaters use the LIVE BETTER . . . *Electrically* theme as a prominent identifying and unifying device. This is another example of how RG&E gets maximum mileage out of the program.

At Electrical Exposition, Rochester Gas and Electric exhibit dramatizes the decorative effects homemakers can achieve with lighting – and an illuminated valance-type display spells out the exhibit slogan: "LIVE BETTER . . . *Electrically*."

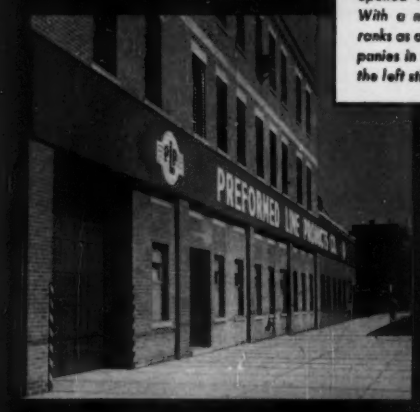
A Good Idea Grows with.

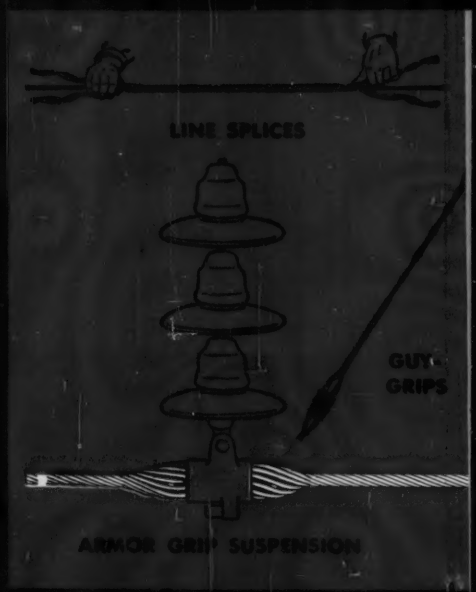
A New Plant in Palo Alto, California

Situated in the well-planned Stanford University's Light Industrial tract, this modern plant now serves the Industry on the West Coast.

In Cleveland, There Are Now Two Plants

Preformed Line Products Company first opened its doors in Cleveland, Ohio. With a new addition—above—it now ranks as one of the fastest growing Companies in the area. The original plant on the left still serves as Home Office.





SALES REPRESENTATIVES C. E. Anderson Co., Tulsa, Oklahoma City, Amarillo, Lawton • Belcher and Associates, Inc., Jackson, Miami • Bergstrom-Verburg Co., Minneapolis • Vincent J. Brown Co., Buffalo, Syracuse • Burns Electric Co., Pittsburgh • Carlton Cooley, St. Louis • P. C. Clattenbaugh, Cincinnati • Earl S. Condon Co., Los Angeles • Cory and Crum, Indianapolis • The Electrical Distributors Co., Philadelphia • Engineer Sales Co. of Carolina, Columbia • J. S. G. Electric Co., Chicago • E. L. Flowers, Westwood • George R. Horne and Co., Dearborn, Toledo • Johnson Sales Co., Bay City • H. L. Mason and Co., Atlanta • Peterson Co., Denver • Elgin B. Robertson, Inc., Dallas, Houston • R. M. Ryals Co., San Francisco • Shaffer and Nelson, Portland, Seattle, Spokane • M. H. Snyder & Sons, New York • Curtis H. Stout & Co., Little Rock, Memphis, New Orleans, L. G. Wendegatz, Kansas City

the Industry It Serves...

The *Preformed* Armor Rod was the first product introduced by Preformed Line Products Company in 1947. It was invented by Thomas F. Peterson and developed by PLP for application as protective sheathing of conductors at support points. The Armor Rod, utilizing the "preformed idea", proved to be a worthy product. It is simple, inexpensive and easy-to-install, for use in both the transmission and distribution fields of application.

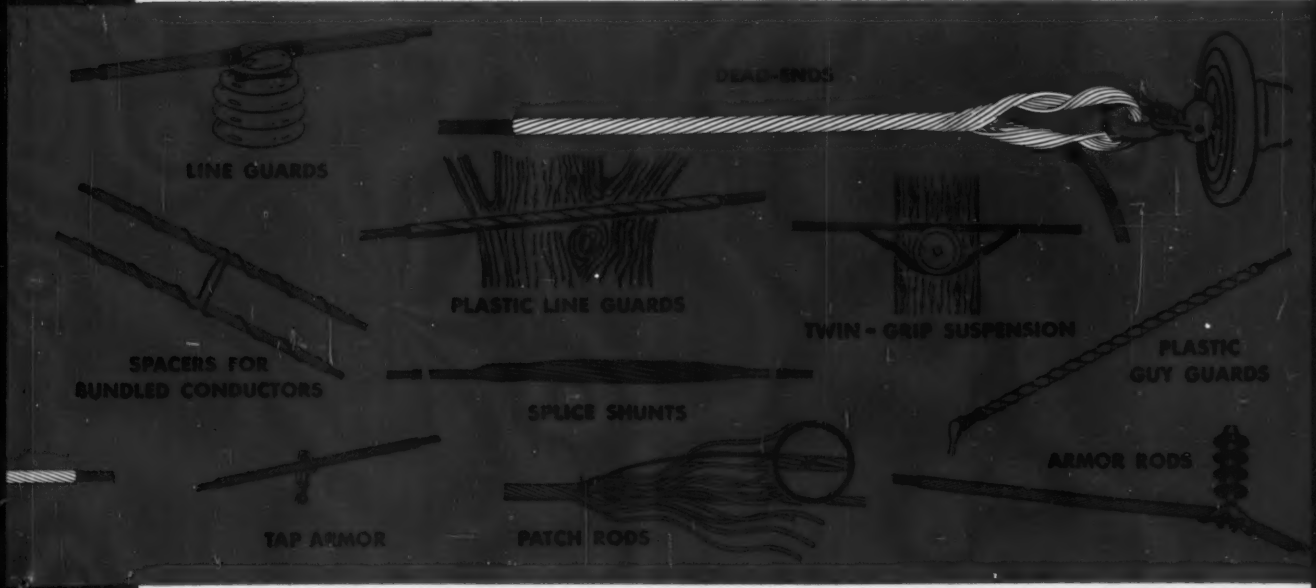
With acceptance came growth. Preformed Line Products Company steadily added to its staff, production capacity and facilities. From a modern up-to-date laboratory (where new and better products are constantly being sought) many new PLP Products sprang from the original "preformed idea". By keeping pace with the industry, the latest production techniques and quality controls were added.

Yet, one of the most important factors contributing to the Company's growth, has remained constant... *SERVICE TO THE INDUSTRY.*

Proof that GROWTH and SERVICE have always gone hand in hand at PLP is attested by the thousands of successful installations that have spread to all parts of the country.

Now, with the addition of a new plant in Palo Alto, California, and a second plant in Cleveland, Preformed Line Products Company has taken two more important steps to assure even greater service to the Industry it serves.

For further information on Preformed Products, write or call Preformed Line Products Company, Cleveland, Ohio: EXpress 1-3571.



Made in accordance with or for use under one or more of the following U. S. Patents: 2,722,393; 2,275,019; 2,587,521; 2,609,653; 2,691,865; other patents pending.

PREFORMED LINE PRODUCTS CO.

5349 St. Clair Ave. • Cleveland 3, Ohio • Phone: EXpress 1-3571

Telephone installations show . . .

Where Polyethylene brings savings

INDIANA—A substantial saving in poles is evident in this rural area. The light weight of cable covered with polyethylene permits smaller poles, longer spans, faster installations. In many cases, cable can be strung without a messenger. Splicing has been greatly simplified.

The polyethylene covering has been found highly resistant to ice formation during the sleet storms common to northern Indiana. Where underground installations are made, polyethylene has eliminated the problem of electrolytic action in the soil. Installations in the near future will have much of this cable plowed underground, at a considerable saving.

WEST VIRGINIA—Installation of additional lines here in the mountains is a costly undertaking. Steep slopes overgrown with trees and brush make rights-of-way practically inaccessible to motorized equipment. In addition, holes for poles must often be blasted through rock.

Most of these problems are solved by distribution wire covered with lightweight polyethylene, now used almost exclusively in this area. This cable can be strung on existing poles, often without adding crossarms. Where lines are strung along railroads and near coal preparation plants, the chemical-resistant polyethylene promises protection from chemical fumes.

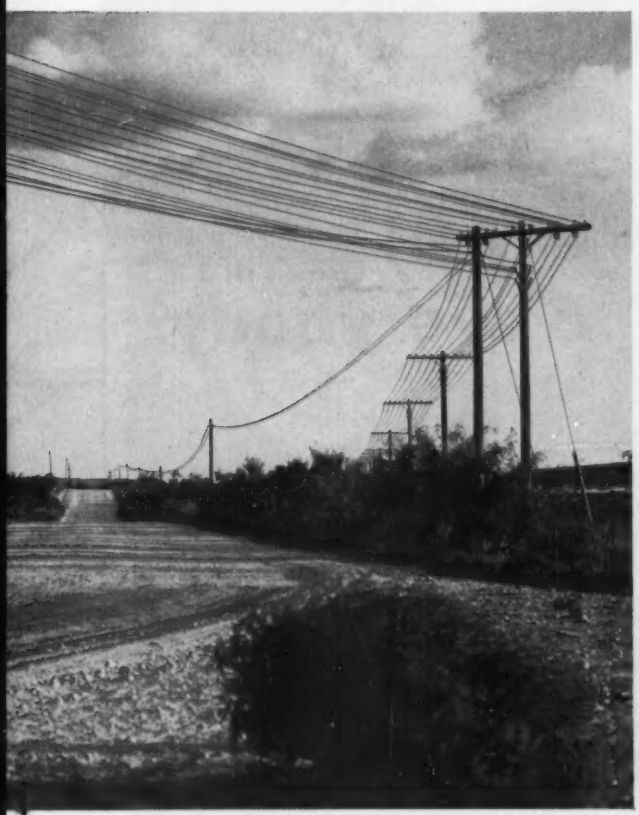
These field reports from the telephone industry may help you evaluate the economies possible with polyethylene-insulated cable in your own installations. Taken together, they represent many years of experience with BAKELITE Brand Polyethylene under a variety of terrain and climatic conditions.

The light weight of this insulation has saved time and effort in installation; in fact, some installations would have been next to impossible with earlier materials. The moisture resistance of polyethylene has minimized weather hazards, while dielectric strength has far exceeded telephone requirements. The strength and flexibility of polyethylene have simplified cable handling.

In addition to telephone applications, BAKELITE Polyethylene is extensively used in utility line wire and service drop, power cable, coaxial cable, and signal control cable. Besides satisfying REA requirements for plastic-covered telephone wire, it meets applicable IPCEA specifications for power cable, ASA standards for weatherproof wire, ASTM D1238-52T Type II, dielectric materials, and IMSA specifications for fire alarm and signal control cable. For more information, write Dept. RH-53.

BAKELITE
BRAND
Polyethylene Plastic

BAKELITE COMPANY, *A Division of Union Carbide and Carbon Corporation* UCC 30 East 42nd Street, New York 17, N. Y.
In Canada: Bakelite Company, Division of Union Carbide Canada Limited, Belleville, Ontario
The term BAKELITE and the Trefoil Symbol are registered trade-marks of UCC



TEXAS—These parallel telephone lines illustrate the savings possible with polyethylene-covered cable. Here, the new lines require ⅓ fewer poles as a result of the extremely light weight of the polyethylene.

Over a million pair-feet of polyethylene-covered cable are in service, and 70 million more are on order for this section, where climate ranges from semi-tropic to semi-desert. The polyethylene jacket must withstand heat, cold, wind, icy and arid conditions. When cable is placed underground, as in urban areas, the polyethylene resists corrosion by stray electric currents in the earth.

VIRGINIA—This terrain combines steep slopes and meadowland, much of it covered by sharp rocks. Problems include the difficulty of placing poles, the need to use only "overhead" rights-of-way at many points, and possible damage to ordinary cable covering if it comes into contact with the stony ground.

Under these circumstances, the lighter, tougher, more flexible polyethylene-covered cable was a distinct advantage. It permitted longer spans to stretch from hill to hill without poles in the fields. It was strung through blocks on the messenger in sections impassable to trucks. There was never any danger of its sagging to the ground and being cut on the rocks.

the P&K story

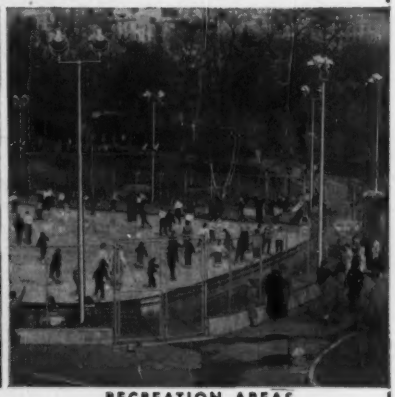
HIGHWAYS

DRIVE-INS

BETTER LIGHTING everywhere

SHOPPING CENTERS

PARKING AREAS



RECREATION AREAS

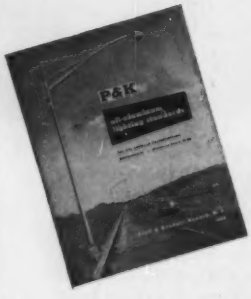
AT LOWER COST to everybody

Pfaff & Kendall, originator of the Seamless Tapered Aluminum Lighting Standard and Tapered Elliptical Arm, is now producing designs and types to meet any highway, road, area, bridge and traffic signal requirement.

Wherever P & K All-Aluminum Standards and Brackets are specified and installed, the story is the same: *Fewer technical problems . . . rapid, easy installation . . . greater lighting efficiency . . . and the kind of economy you can figure in actual dollars!*

P & K All-Aluminum Standards and Brackets are always the wisest choice . . .

LIGHT WEIGHT for lowest cost installation.
NEGLIGIBLE CORROSION for longest service.
NO PAINTING means large, year-after-year savings.
SALVAGEABLE, RE-USABLE in event of knockdown.



WRITE FOR LATEST P & K CATALOG... and use the P & K planning and advisory services without obligation.

Pfaff & Kendall
84 Foundry Street
Newark 5, New Jersey

moisture sealing

BI-SEAL SELF-BONDING (polyethylene based) ELECTRICAL TAPE

No other tape has such low water absorption (.0065%) . . . Bi-Seal's power factor is .0006 for 1000 cycles . . . Operating temperatures from —40 to 80°C . . . Shelf life unlimited. Particularly recommended as the primary insulation for polyethylene wire and cable splicing and moisture sealing bi-metal connections. Ideal for use in high frequency circuits.

BISHOP'S "BIG FIVE"

for Sealing, Splicing, Jacketing, Insulating

insulation build-up

NO. 125 ELECTRICAL FILLER TAPE

Fills voids rapidly . . . provides foundation for subsequent tape layers . . . a 1/8" thick insulating compound in tape form that can be molded to any shape or contour. Used for cable splice build-up . . . covering sharp cornered connectors . . . padding bus bars . . . cable end sealing.

all-purpose

VINYL ELECTRICAL TAPE

A thin, tough, resilient, pressure-sensitive tape with great adhesive strength. For power transmission and distribution cable splicing . . . for general splicing jobs and all-purpose taping.

Write for complete catalog information

MORE THAN A CENTURY OF ELECTRICAL INSULATION

BISHOP

MANUFACTURING CORPORATION

12 CANFIELD ROAD

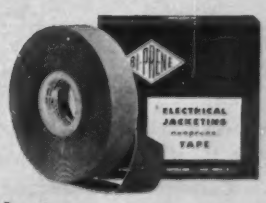
CEDAR GROVE (ESSEX CO.)

NEW JERSEY

high voltage splicing

NO. 30 HIGH VOLTAGE SPLICING TAPE

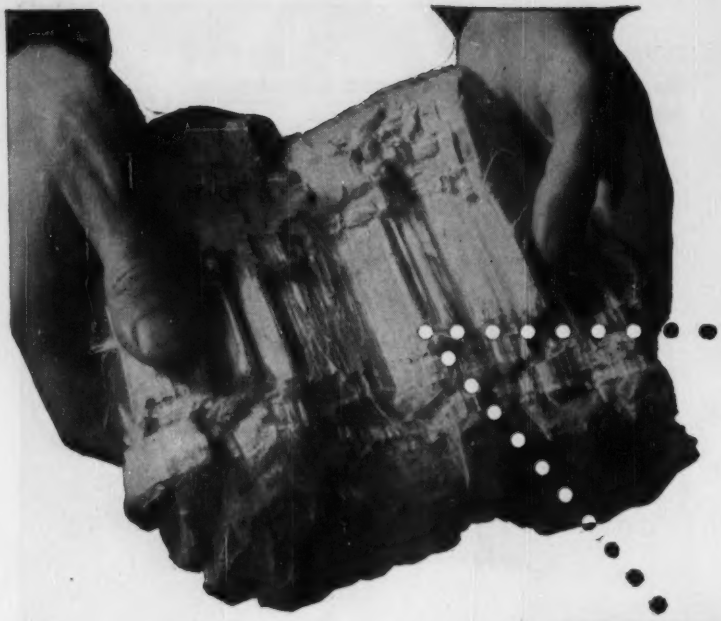
For splicing high voltage cables insulated with ozone-resistant compounds, and operating at 2000 volts or more. Fuses into moisture-proof wall that equals or betters the original insulation . . . Operating temperatures from —40 to 85°C. Very low power factor and moisture absorption. Surpasses ASTM D-1373.



jacketing

BI-PRENE (neoprene) JACKETING TAPE

Protects cable splices where oil, grease, ozone, heat, moisture, sunlight, etc. are factors. This self-fusing tape is intended particularly for use as a jacketing tape for neoprene sheathed cables.



From the magic mineral

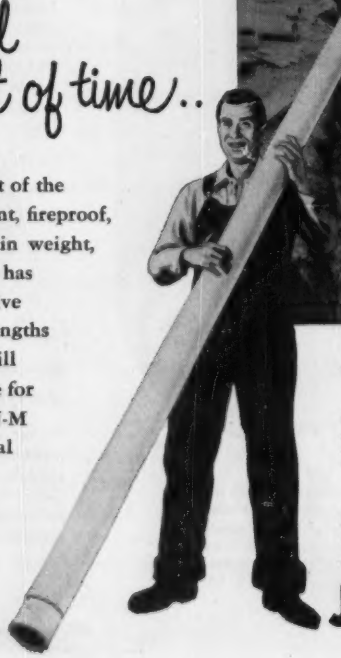
...ASBESTOS

come these strong, durable

TRANSITE DUCTS

made to stand the test of time..

Transite* meets every requirement of the ideal duct material. It is permanent, fireproof, corrosion resistant, strong, light in weight, smooth-bored, non-inductive, and has rapid heat dissipation. No protective coating is required. The 10-foot lengths are rapidly assembled. Transite will outlast other duct materials. Write for new, free brochure showing how J-M Transite Ducts can effect substantial savings in both installation and maintenance of cable subways. Address Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay St., Toronto 1, Ontario.



Available In Two Types:

TRANSITE CONDUIT

Thick walled, used for exposed work, or buried without concrete casement saves time, labor, materials.

TRANSITE KORDUCT

Thinner walled for installation in concrete. Used for high-voltage lines, its high thermal conductivity cuts operating losses.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville

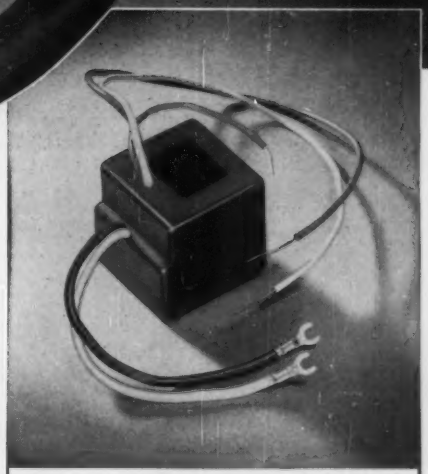
*Trade mark registered

PROVEN ECONOMY BOOSTS USE OF SANGAMO J2T

The high accuracy, low maintenance, and long life of Sangamo J2T singlephase thermal demand-watthour meters set the pace for the greatly increased use of these combination units.

Their fine performance record helped boost total sales of all manufacturers by 16,313 more thermal combinations in 1955 than in 1954.

The J2T is ideally suited for application to singlephase residential and commercial loads. It is supplied with a 24 KW scale to take full advantage of the 100 ampere range of J2 Watthour Meter. It is also available with a 12 KW scale for power companies who measure demands on smaller loads and want indications above ¼ to ⅓ scale.



Better protection from lightning and high voltage surges

The insulation levels of the demand element and the watthour meter element of these combination meters are equally high. The potential transformer coil of the demand element is encapsulated in Sangamo Secolene, a specially developed epoxy resin with extremely high dielectric strength.

Write for more information on these cost-cutting demand meters today.

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

SM56-E

For a Really Safe

It takes 3 tanks

Even a Small Outdoor Breaker should have Tank-Per-Phase Construction

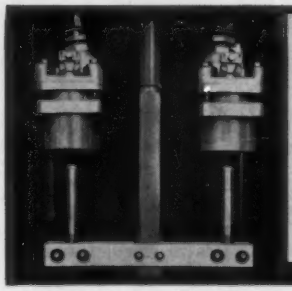
Don't be ⅓ safe! It costs you no more to get the complete safety of 3-tank breakers.

Compare this breaker with others of the same rating, and see the difference. Here's a small outdoor breaker built with big breaker features:

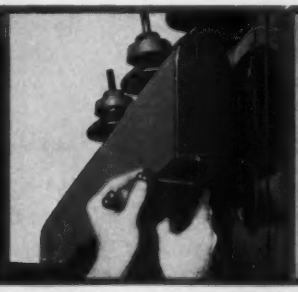
- Tank-per-phase construction completely isolates phases to eliminate internal phase-to-phase flashover.
- Two vertical breaks per phase with time-proved, fully tested *Ruptor* interrupting devices.
- Roomy operator cabinet with side-hinged L-shaped doors for maximum accessibility.

There is no other breaker for 14.4 and 23-kv service that compares with this breaker for safety, ease of maintenance and overall accessibility. It's *quality* throughout.

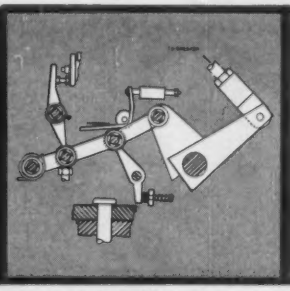
GET INFORMATION and make your own comparison. Call your nearby A-C office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin. A-4933



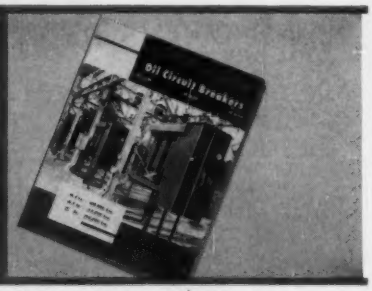
Two vertical internal breaks per phase . . . features time-proved, fully tested *Ruptor* interrupting devices with self-wiping, self-aligning tulip and bayonet contacts.



No buried leads. No more conduits . . . no dropping of breaker tanks to get at bushing current transformer leads. Simply remove bottom cover plate of fabricated wiring duct.



Four-bar linkage like ones on large A-C breakers provides mechanically trip-free operation. Simple solenoid operator — factory-set shim adjustments cut maintenance.



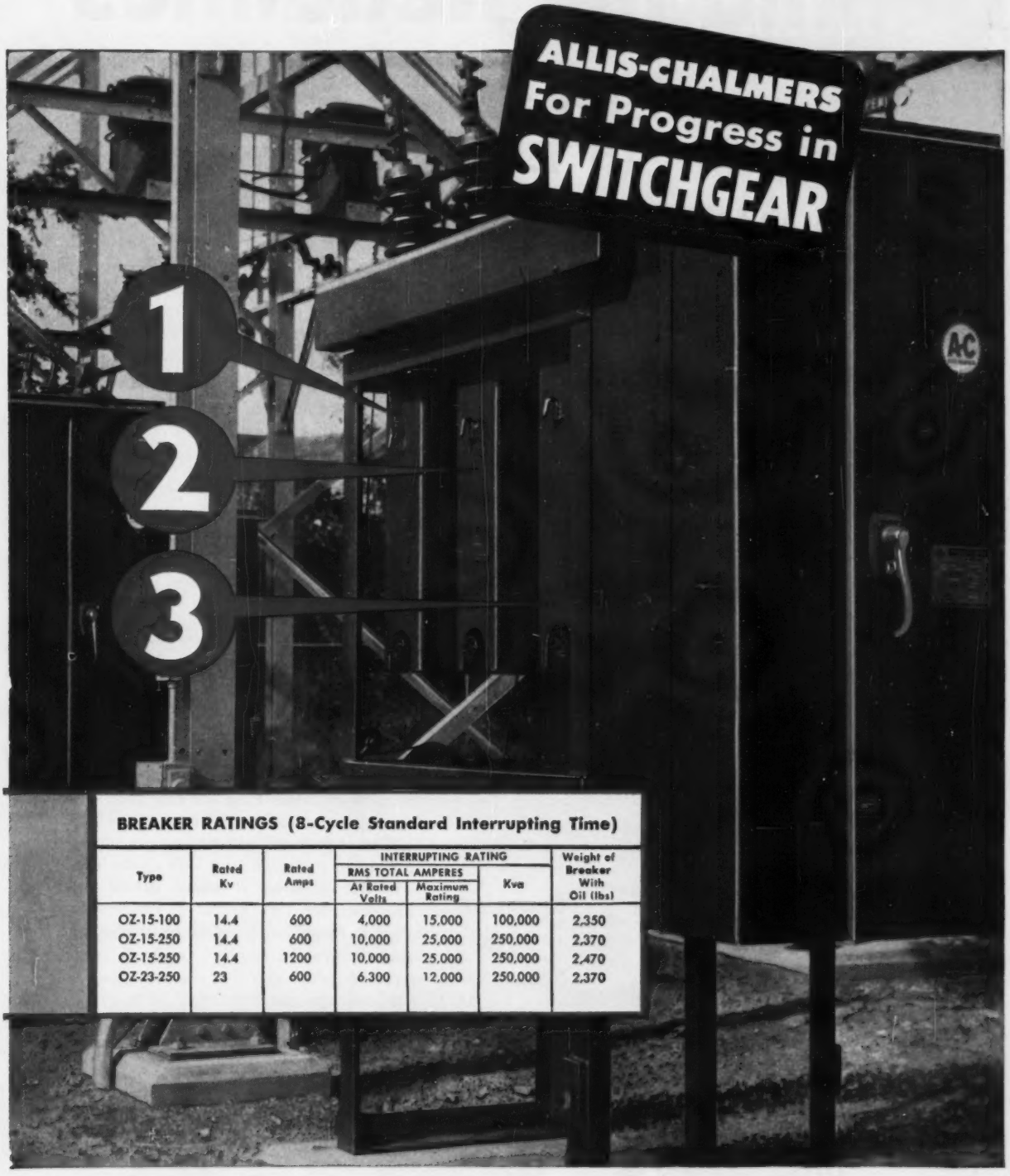
Eight-page bulletin 71B7946 tells the complete story. It shows the many quality features ordinarily found only in the larger breakers built into these units.

Ruptor is an Allis-Chalmers trademark.

A-C ALLIS-CHALMERS

ALLIS-

Distribution Breaker . . .



BREAKER RATINGS (8-Cycle Standard Interrupting Time)

Type	Rated Kv	Rated Amps	INTERRUPTING RATING			Weight of Breaker With Oil (lbs)
			RMS TOTAL AMPERES		Kva	
			At Rated Volts	Maximum Rating		
OZ-15-100	14.4	600	4,000	15,000	100,000	2,350
OZ-15-250	14.4	600	10,000	25,000	250,000	2,370
OZ-15-250	14.4	1200	10,000	25,000	250,000	2,470
OZ-23-250	23	600	6,300	12,000	250,000	2,370

CHALMERS

Behind the Headlines

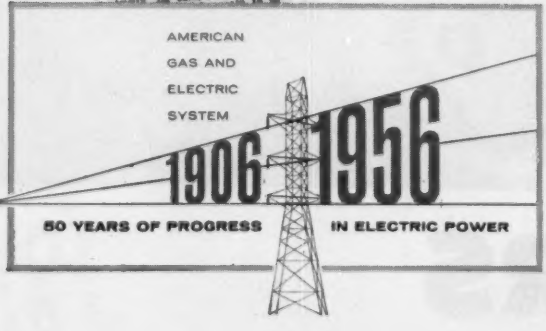
50 Years of Progress in Electric Power

Utility Will Build Giant Generators
Business Milestones
American G & E Unit Plans $125 Million Ohio Steam Generating Plant
American Gas Plans Huge Expansion
Muskingum Power Plant To Expand
American G&E Plans Five-Year, $700 Million Expansion Program
Firm Proposes to Add 2,600,000 Kilowatts to Capacity by 1960 At Cost of $350 Million
NEW MARKS SET BY AMERICAN GAS
Utility's Net Was at Record Levels for First Quarter, 12 Months and March

THE STORY OF American Gas and Electric's fifty years could probably be told in news clippings alone. Some, yellowed and torn and buried under auditors' reports in some almost forgotten room, highlight AGE's earlier years—its growth, its problems, its successes.

And other clippings show the tremendous strides made in the postwar years. A sampling from this year alone—not yet half over—reports that AGE has undertaken an unprecedented $700 million five-year expansion program . . . announced that 1955 broke all records for sales and earnings . . . and, most recently, contracted for the building of the world's two largest turbo-generators, each to generate 450,000 kilowatts.

We expect to continue to merit these headlines because progress is something that never stops. Even while you read this, new developments are taking place at AGE which will make possible our continuing to supply the growing area we serve with all the low-cost electric power it wants. Behind the headlines are "50 Years of Progress in Electric Power"—a good base on which to start the next 50.



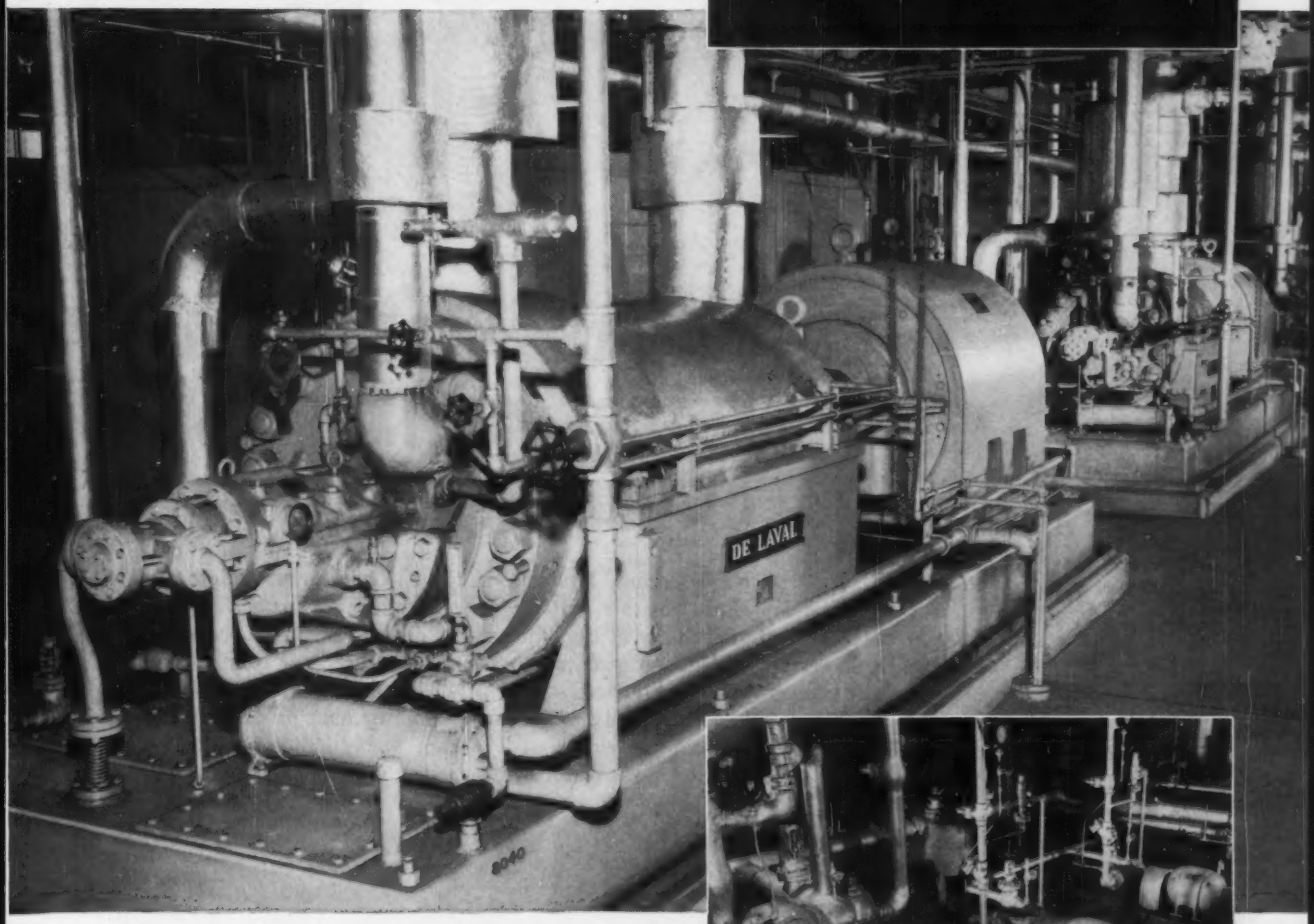
AMERICAN GAS AND ELECTRIC COMPANY

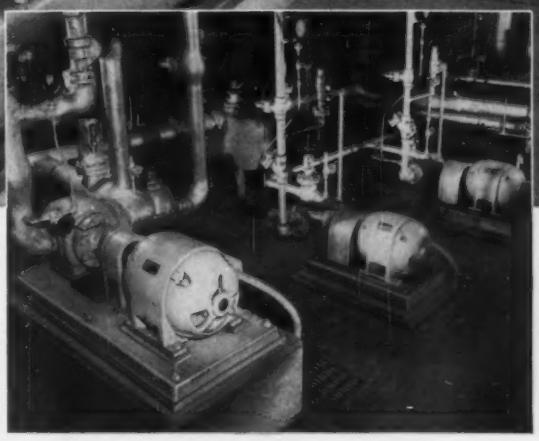
OPERATING AFFILIATES:

- APPALACHIAN ELECTRIC POWER COMPANY
- KENTUCKY POWER COMPANY
- KINGSPORT UTILITIES, INC.
- OHIO POWER COMPANY
- INDIANA & MICHIGAN ELECTRIC COMPANY
- WHEELING ELECTRIC COMPANY

Atlantic City Electric ... another utility using

DE LAVAL
BARREL TYPE BOILER FEED PUMPS





De Laval IMO rotary positive displacement pumps handle heavy fuel oil. They are used for standby operation.

Atlantic City Electric Company knows it can count on De Laval reliability. Three De Laval high pressure, barrel type boiler feed pumps are on the line at their Deepwater Station in Penns Grove, New Jersey. These 10-stage units deliver 675 gpm, operating at 1762 psi with temperature at 287 F. The pumps are driven by 900 hp motors.

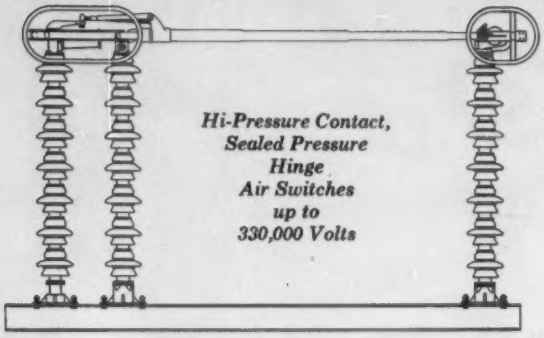
De Laval barrel type boiler feed pumps operate at pressures up to 5500 psi. These units offer many important design advantages, such as double volute diaphragm, individual diaphragm bolting, only one inner high-pressure joint, and bare shaft construction. Their dependability is proven by year in, year out service in public utilities and industrial plants.

Send for De Laval Bulletin 1506, which contains helpful data.

DE LAVAL *Boiler Feed Pumps*

DE LAVAL STEAM TURBINE COMPANY
861 Nottingham Way, Trenton 2, New Jersey

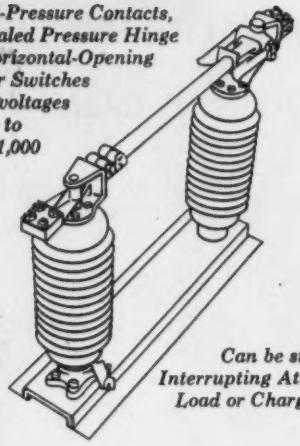
DL-343



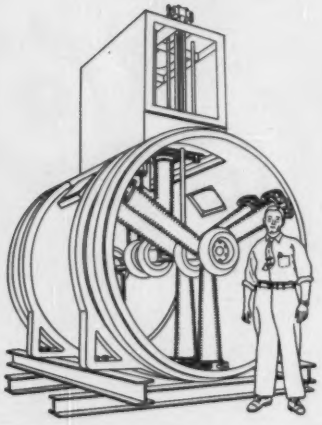
Hi-Pressure Contact, Sealed Pressure Hinge Air Switches up to 330,000 Volts

Can be supplied with interrupting attachments

Hi-Pressure Contacts, Sealed Pressure Hinge Horizontal-Opening Air Switches in voltages up to 161,000



Can be supplied with Interrupting Attachments— Load or Charging Current

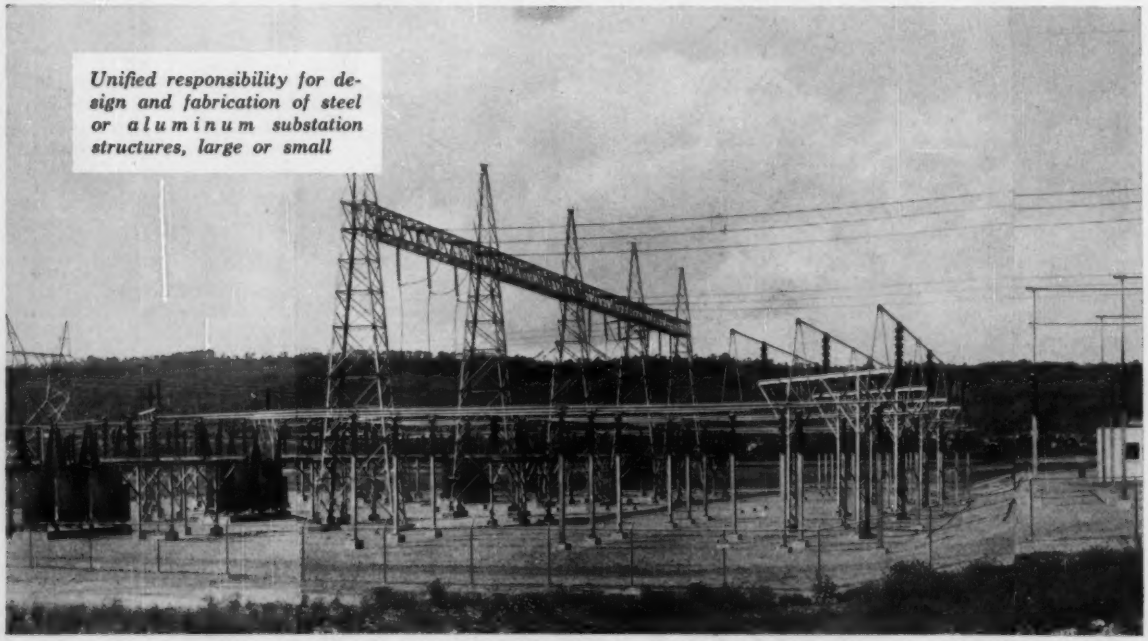


Isolated Phase Bus and Switches, all ratings up to 138,000 Volts

R&IE HAS A STAKE IN THE FUTURE OF INVESTOR-OWNED UTILITIES

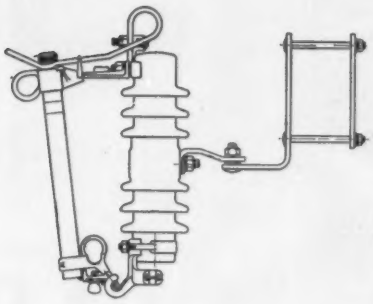
In 1910, R&IE became a pioneer in the Electric Power Industry—with the first horn gap air switch. In the following forty-five years, R&IE contributed many of the equipment "firsts" that improved electrical service. R&IE is dedicated to continued search for original and more efficient switching devices.

Power Systems are only as good as the equipment on them. The R&IE Research and Development Program vigorously established a big stake in the growing investor-owned power industry.

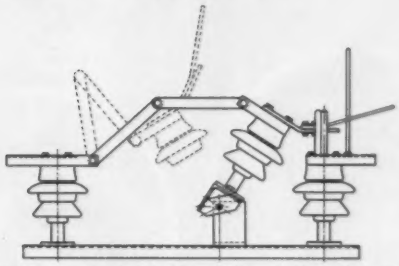


Unified responsibility for design and fabrication of steel or aluminum substation structures, large or small

Open Type and Load Break Cutouts



Tilting Insulator Shuntless Distribution Switches, in voltages up to 34,500



Can be supplied with Load Break Attachments

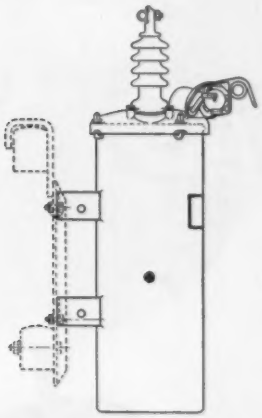
FROM THE R&IE RESEARCH LABORATORY

Famous R&IE Firsts . . .

1—"Burke" Air Switch **2**—Interchangeable Insulator Units **3**—Hi-Pressure Contact Switches **4**—Isolated Phase Bus **5**—Power Class Automatic Circuit Reclosers **6**—Sealed Pressure Hinge Contacts **7**—Cam-Type High Current Disconnecting Switches

Famous R&IE Futures . . .

1—Wider Application of Interrupting and Load Break Devices **2**—Higher Continuous and Momentary Capacity **3**—Higher Voltages, with its problems of Gap Distances, Phase Spacing and Withstand Values

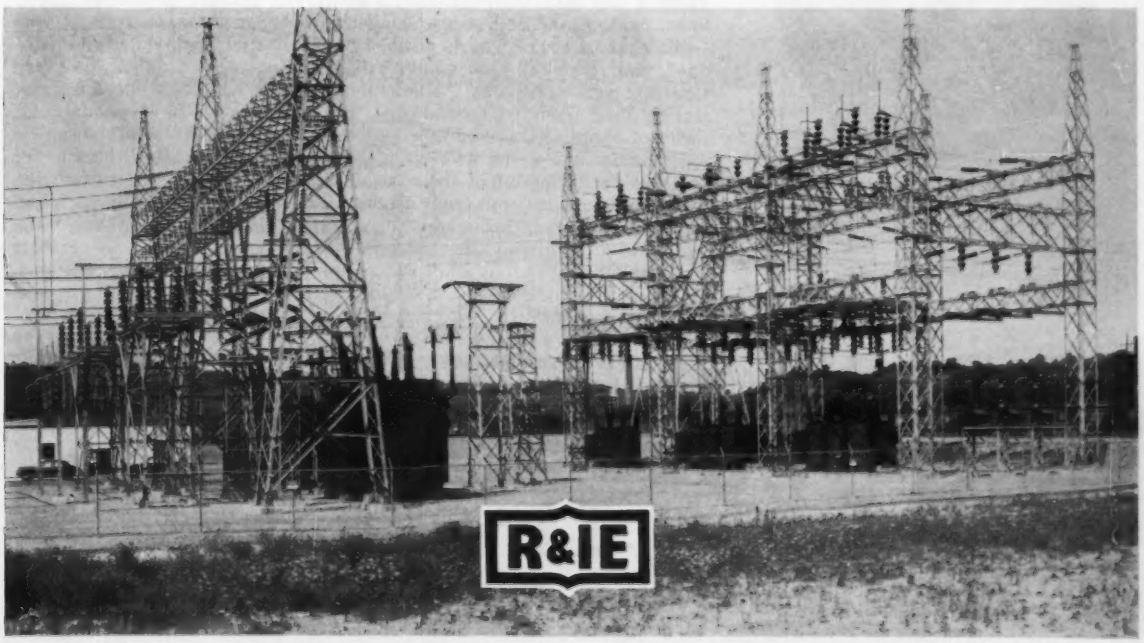


Power Class Automatic Circuit Reclosers

●

R&IE EQUIPMENT DIVISION

I-T-E CIRCUIT BREAKER CO., GREENSBURG, PA.



LimiTorque® provides push-button operation for Unitized Steam Generation System ... at Cromby Station, P.E. Co.

FROM A CENTRAL CONTROL PANEL ROOM—on intake; circulating pump lines; heating and re-heating; condensate; boiler stop and re-heat lines —the exact status of each vital valve is always readily determined—open, stop, close, all by the mere "push of a button." LimiTorque Valve Controls were chosen by Philadelphia Electric Company for this great station (and their other stations), because of absolute dependability, speed of operation, saving in man hours, and the positive protection of valve seats and stems from possible damage. In addition, because of the "Unitized" layout of this station, any possible difficulties occurring to one unit are isolated from others, thus facilitating maintenance and repair at any time, throughout the station.

A total of approximately 400 LimiTorque Automatic Valve Operators are installed throughout all of Philadelphia Electric's fine power stations. Many of the modern central stations recently built, or now under construction, feature fully Automatic Valve Operation by LimiTorque.

We will give you the full story on LimiTorque and its many time and cost saving applications . . . Just write for Catalog L-550 . . . on your Business Letterhead, please.

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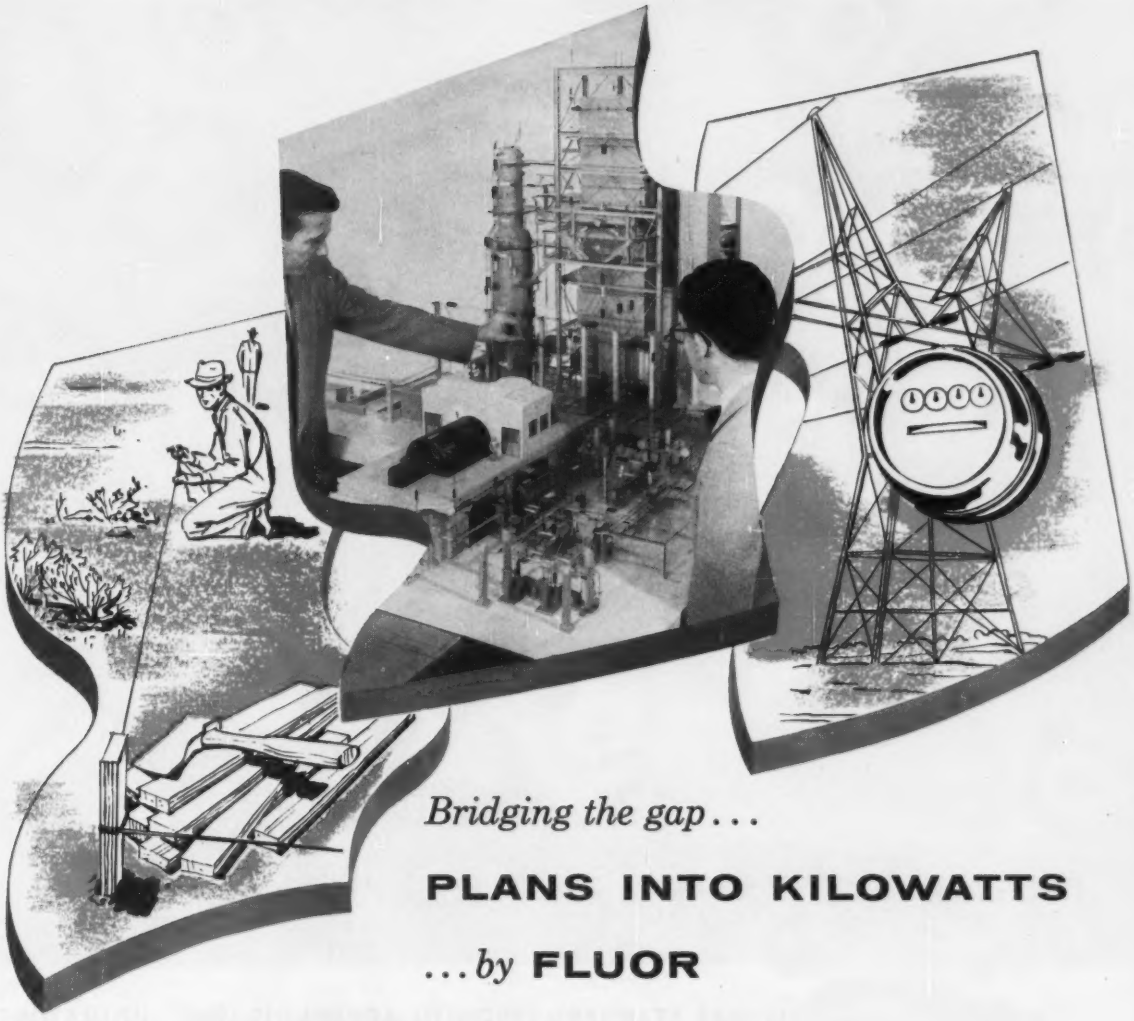

Bridging the gap . . .

PLANS INTO KILOWATTS

. . . by **FLUOR**

A study of America's growing economy shows why the electric power industry is building toward an estimated generating capacity of 2 billion kilowatts within the next 40 years.

For these new facilities, the power industry has found that it can look to the Power Engineering Department of The Fluor Corporation, Ltd. for plants characterized by early completion, construction within estimates and consistently high efficiencies. At Fluor, one of the best balanced, experienced engineering and construction staffs available in industry today stands ready to design and build plants of any kilowatt rating and any basic design: from conventional steam turbine to nuclear reactor. Modern methods . . . . symbolized by the detailed engineering model shown above (that of a steam-turbine unit) and the broad background of a permanent staff serving *many* industries . . . . combine to prove that in electric power, too, "you can be *sure* with Fluor."

The organization and working methods of Fluor's Power Engineering Department are outlined in a newly released bulletin. Write for your copy today.

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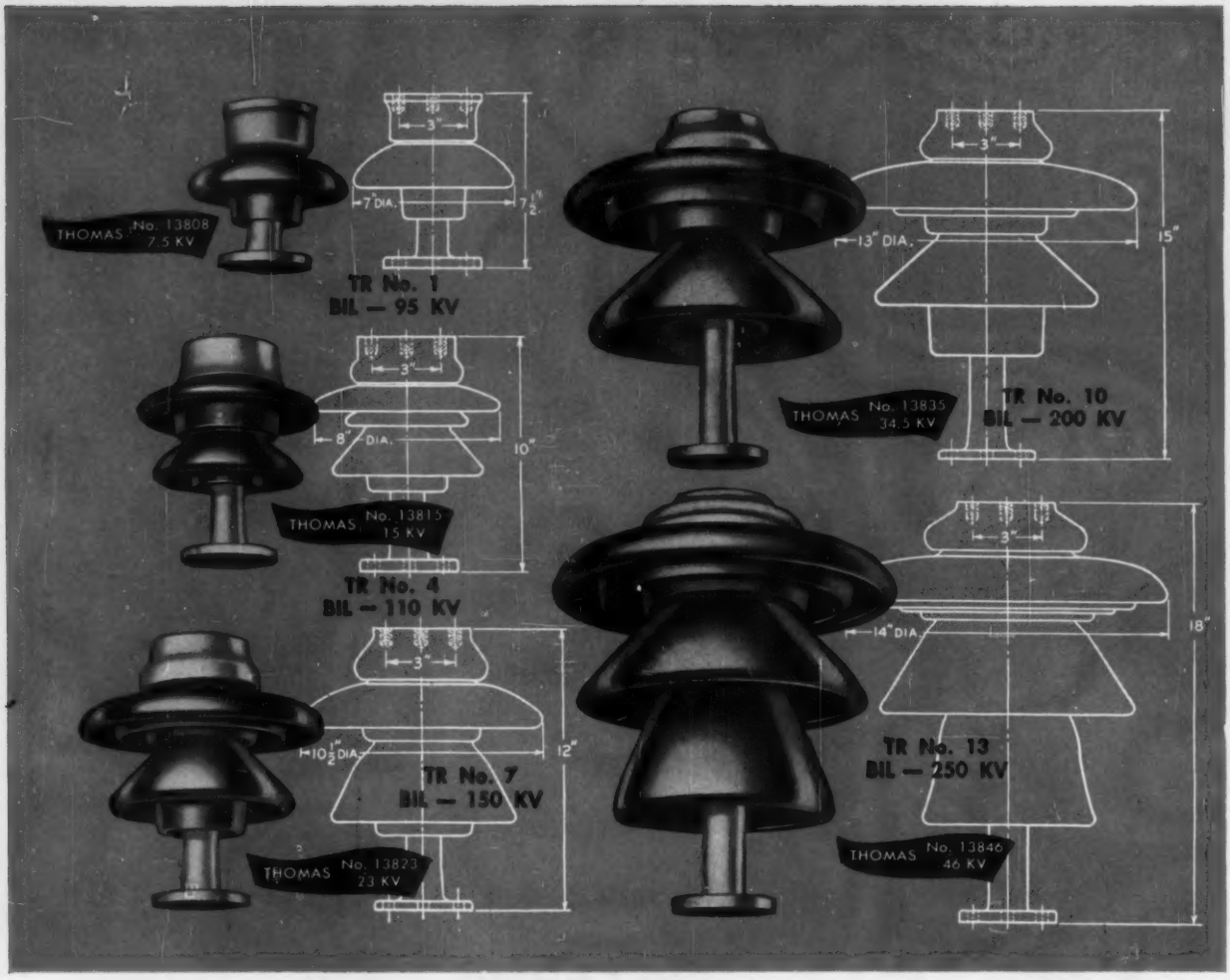

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THOMAS STANDARD-STRENGTH APPARATUS "BIL" INSULATORS FULLY CONFORM TO NEW EEI-NEMA STANDARDS

THOMAS is 100% in support of the new EEI-NEMA Standards because these standards help the whole Industry. And since the beginning of the Electrical Industry, Thomas has consistently been in the forefront of its phenomenal growth.

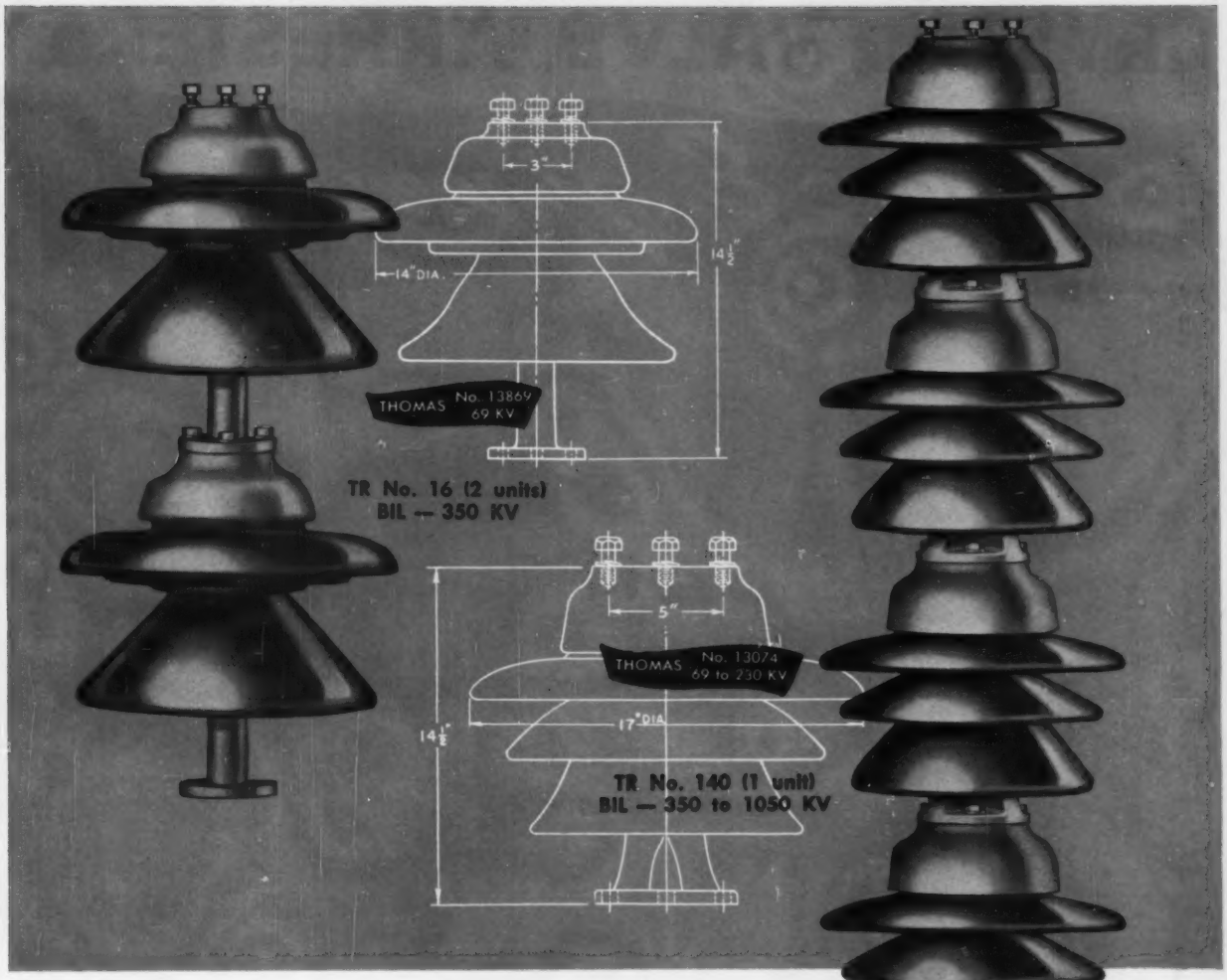
TODAY, in our 83rd year, we have improved facilities and increased capacity to meet the most exacting needs of the Industry. After all is said . . . it's still quality that counts plus proper designing, precision manufacturing . . . and PROOF OF PERFORMANCE.

EXCELLENT service records attest to the High Quality of Thomas Apparatus Insulators.

1873 THOMAS INSULATORS our 83rd year RELIABILITY 1956

The R. Thomas and Sons Co.

LISBON, OHIO



Specify Thomas Insulators / ***The Best by Line Test***

The R. Thomas and Sons Company, the Pioneer in the Electrical Porcelain Industry, manufactures and designs all types of porcelain insulators . . . apparatus, suspension, pin-type, guy-strain and spools . . . ALL CONFORM TO EEI-NEMA STANDARDS.

In addition, Thomas produces many special types of porcelain insulators and supplies associated line hardware, clamps, fittings, and so on.

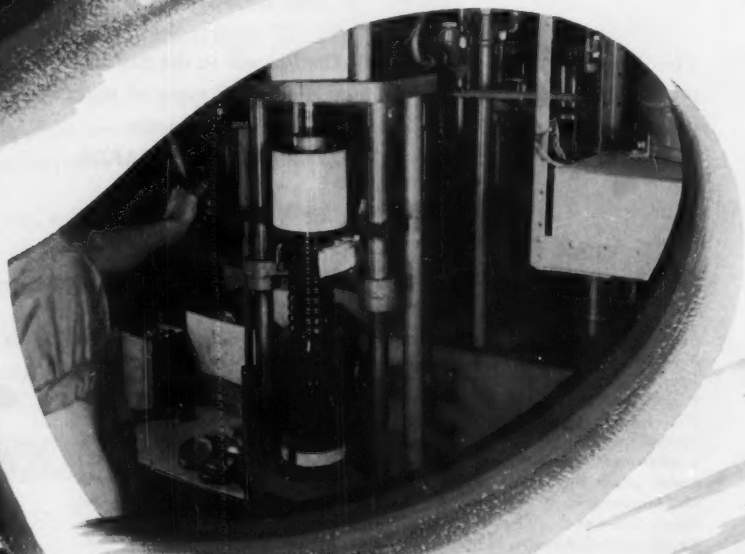
Sales Representatives: **C. G. Anderson, *Chicago* • E. B. Anderson Co., *Detroit* Ken H. Best, *Seattle* • Nellis B. Bronner, Jr., *Syracuse* • R. E. Cunningham & Son, *Los Angeles* • W. H. Eddy Electric Products, Inc., *Phoenix* • Electrical Distributors Co., *Philadelphia* • Engineer Sales Co., *St. Petersburg* • Hamilton Associates, *Denver* • Geo. E. Henn Co., *San Francisco* • Hugo Sales Co., *Minneapolis* • J. E. Johansen, *Lincoln* • J. P. Lane Co., *St. Louis* • J. O. Mann, *Pittsburgh* • Osgood & Associates, *Atlanta* • John G. Pettijohn Co., *Knoxville* • J. F. Schaefer & Co., *Kansas City* • Southeastern Electric Supply Co., *Richmond* • Walter E. Thompson Co., *Birmingham* • Triangle Electric Supply Co., *El Paso* • United Electric Supply Co., *Salt Lake City* • J. H. Warrington, *Lexington* • Williamson Sales Co., *Shreveport, Amarillo, Beaumont, Corpus Christi, Dallas, Houston, Jackson, New Orleans, Pine Bluff, San Antonio, Tulsa* • *Representatives in other principal cities***

CRYSTAL VALVE ARRESTERS

Service Engineered . . .

DEVELOPMENT

More than 60 years of specialization in the manufacturing of lightning arresters . . . plus extensive laboratory and field tests assure arresters designed, developed and engineered for positive protection.

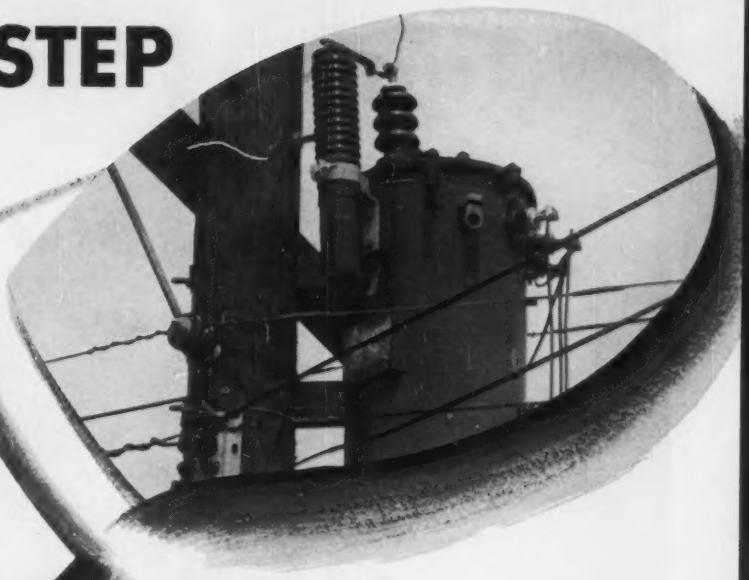


MANUFACTURING

Every step in the manufacture of Crystal Valve Arresters is engineered for unfailing service. Perfect valve action element, moisture-proof sealing, ultra speed spark-gap structures are all built into every C.V. Arrester.

ELECTRIC SERVICE

IN EVERY STEP



PERFORMANCE

The service engineered into C.V. Arresters has proved itself by years of performance in every major utility company in the U.S. and throughout most of the world. The record of C.V. Arresters proves them to be the best available.

SERVICE

Strategically located warehouse and factory stocks save on inventories needed. You are assured of speedy, accurate, efficient service in handling your requirements.

For real service that is engineered in every step to give you positive protection of your lines take the step now to CRYSTAL VALVE "Service Engineered" ARRESTERS. Write for full details.

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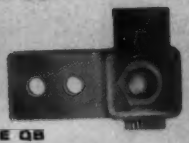
how's your QA-IQ?

TYPE Q2A

TYPE QA-50

TYPE QQA



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TYPE Q3A

Did you know all of these terminals incorporate all standard Qiklug features?

Popular sizes in stock to meet your individual requirements.

QIKLUG
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Available for wire sizes #14 thru 2000Mcm.

Get the right answers to all your connector problems.
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Progress in turbine-generators

How General Electric provides maximum reliability in turbine-generator armature insulation

About preceding page illustration

HIGH-VOLTAGE TESTS TO DESTRUCTION are used to determine how much G.E.'s armature insulation can withstand. Forced to carry voltages far above their rating, test bars first develop corona streamers, then finally fail, enabling engineers to discover the insulation's actual voltage strength.

99.85% service availability highlights performance of turbine-generator armature insulation

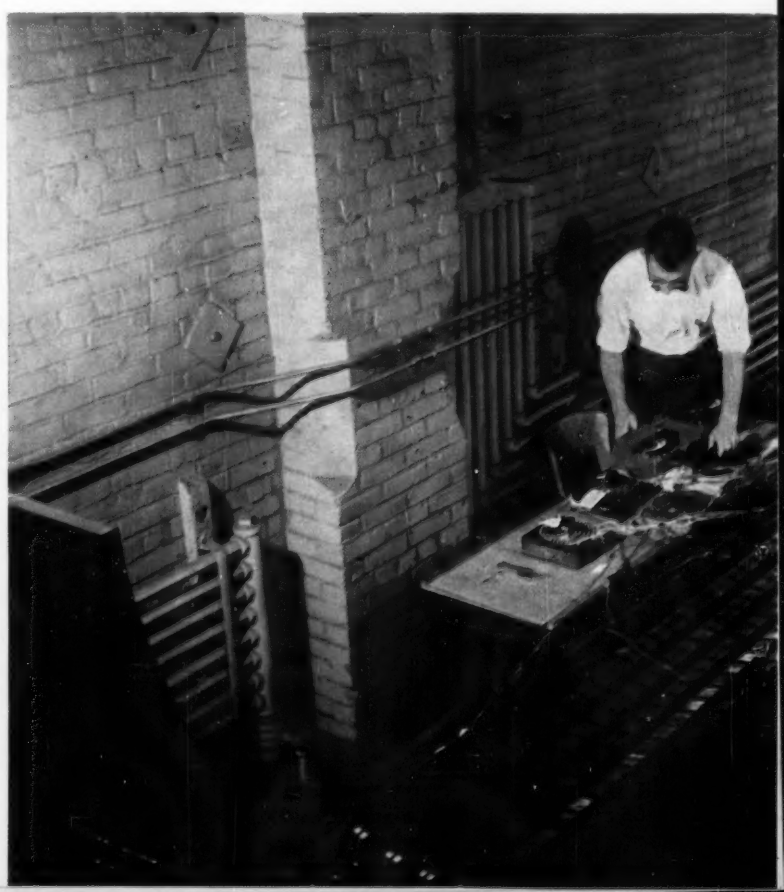
G-E design combines both electrical endurance and mechanical toughness

Primary among the many factors affecting a turbine-generator's long-term service availability is the quality of its armature insulation. It must withstand high voltages over long periods of time. And at operating temperatures it must endure the variable stresses caused by differential thermal expansion and contraction within the generator.

General Electric insulation measures up to these requirements with an already proved service availability of 99.85 percent in turbine-generators.

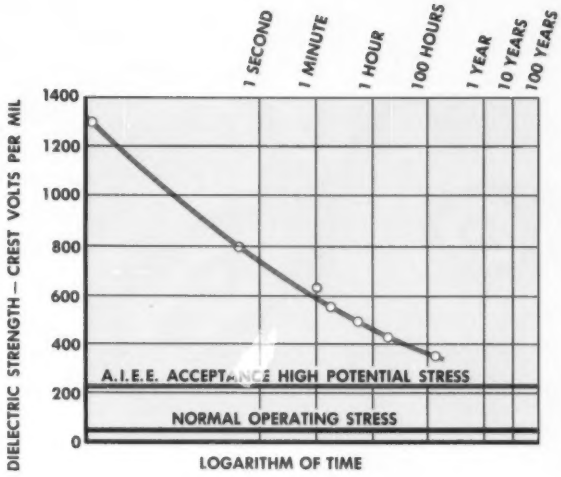
Progress in other areas of generator development often influences the performance of insulation. Larger capacities, higher voltages, different cooling methods all present new problems. To make sure that insulation quality keeps pace, each new generator development includes rigorous tests of insulation under the new set of conditions.

The illustrations on these pages show typical insulation tests constantly under way at General Electric's turbine plant.

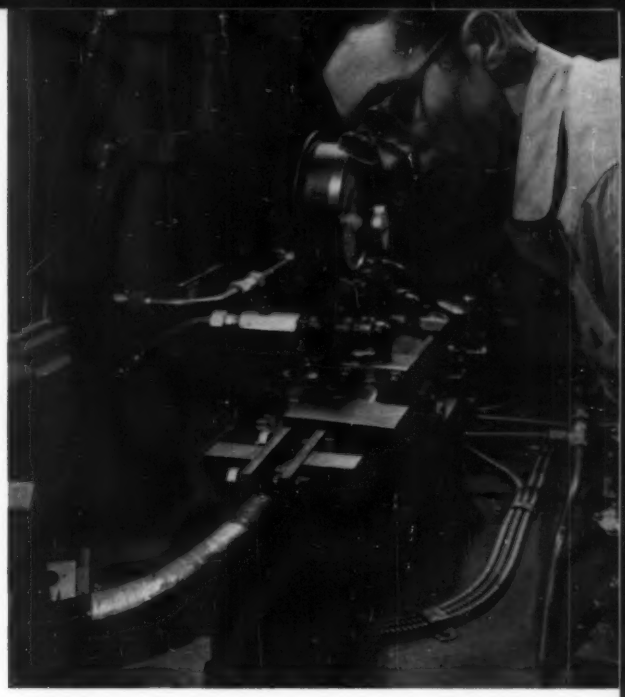


G-E APPLIED RESEARCH is typified by this full-size armature bar test. Here, General Electric engineers find out how well insulations can withstand the mechanical stresses caused by differential thermal expansion and contraction within an operating generator.

To simulate actual operation in this special 17½-foot core section, high currents are run through full-size stator conductors to build up heat; then are shut off while the apparatus is cooled by blowers. This procedure can reproduce ten years of anticipated operating stress cycles in just four months of testing. This important test provides an accurate means of evaluating both present insulation materials and new ones under development.



HIGH-VOLTAGE ENDURANCE of G-E insulation over long periods of time is graphically illustrated here. This record invites comparison with that of any other turbine-generator insulation in service today.



FLEXING TEST determines the insulation's ability to withstand bending caused by expansion and contraction or by short circuits. Here, a G-E engineer evaluates performance of the critical end portion of an armature bar.

EVERY GENERATOR leaving the factory has passed a series of searching high-potential tests. A sample bar, selected at random, is tested to failure. For quality control, each bar is separately subjected to voltage stresses of more than five times normal operating stress. When installed in the generator, the bar is again tested at voltages producing 3½ times normal operating stress. Immediately following generator running tests, windings are "hot high-potted" at operating temperatures, and finally tested at room temperature just prior to shipment.

Leader in Turbine-Generator Progress

GENERAL ELECTRIC

G-E engineers are developing new insulations for larger machines

In the picture above, a G-E development engineer is shown inspecting one of tomorrow's insulations now being developed in the Large Steam Turbine-Generator Department's Materials and Process laboratory. A special processing mill is being used to treat the new type insulating material. The rollers increase homogeneity and orient the structure for improved mechanical and electrical properties.

One of the new materials coming out of this applied research is Micapal, a mica-based synthetic insulation which shows marked improvements in dielectric strength, thermal conductivity, heat endurance, and mechanical strength. The first generator utilizing Micapal has been in commercial operation for more than two years.

Micapal and other insulations now under development will help continue General Electric's record of turbine-generator progress.

If you would like more information on G-E turbine-generator development, contact your nearest G-E Apparatus Sales Office, or write for Bulletin GER-1047, "Research and Development in the Field of Turbine-Generator Prime Movers in the General Electric Company." Large Steam Turbine-Generator Department, *General Electric Company, Schenectady 5, N.Y.*

254-28

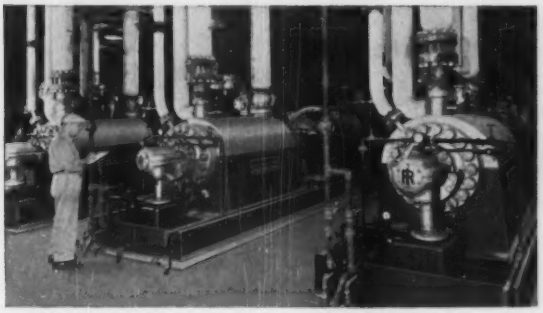
Progress Is Our Most Important Product

GENERAL ELECTRIC

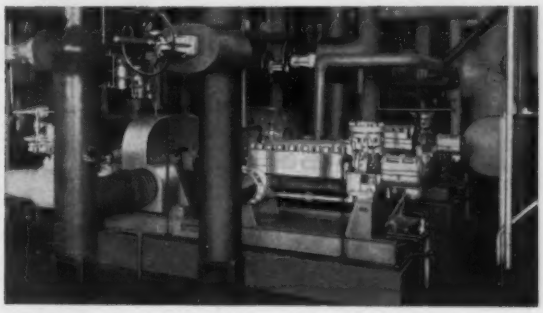
BOILER FEED PUMPS GIVE DEPENDABLE PERFORMANCE

at all pressures, capacities, temperatures.

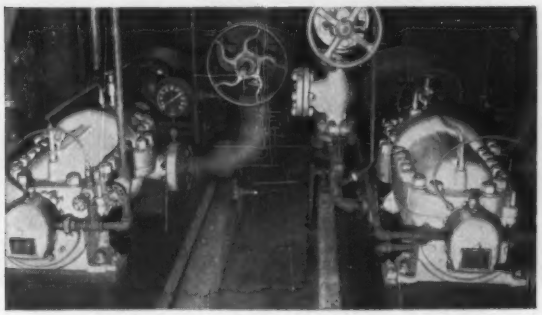
Typical I-R installations indicate wide range of use in central stations and industrial plants



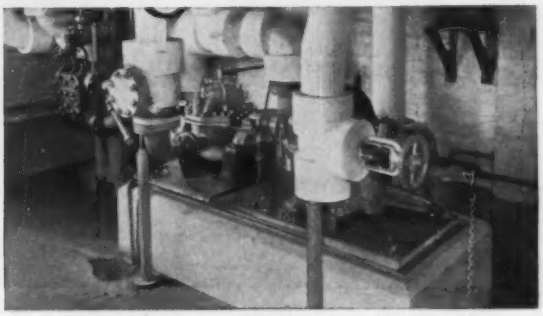
PRESSURES UP TO 6500 psi.—Class CHTA-CHTB: These multi-stage, cylindrical "double-case pumps meet the most exacting needs of the highest-pressure boilers in modern central station service. Each of the above pumps handle 1100 gpm of feedwater at 2395 psi.



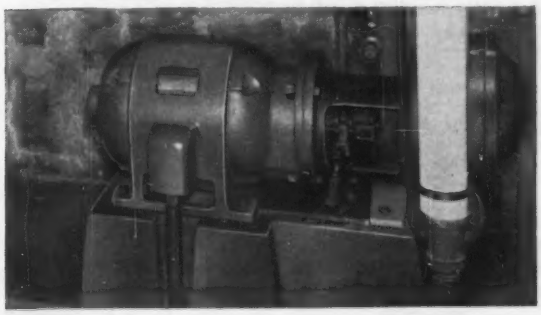
PRESSURES UP TO 1200 psi.—Class HMTA-HMTB: A complete line of multi-stage centrifugal pumps featuring a symmetrical, horizontally-split casing, and a simplified unit-type rotor assembly. The pumps illustrated are on boiler feed service in a large textile mill.



MEDIUM PRESSURES UP TO 1000 psi.—Class CNTA: Symmetrical design with unit-type rotor gives CNTA pumps higher efficiency, easier maintenance, and attractive modern appearance. Installed in a large paper mill, the boiler feed pumps shown operate at 3560 rpm and deliver 180 gpm at 605 psi.



PRESSURES TO 450 psi.—Class GT: Dependability is designed into this line of two-stage, horizontally split pumps. Standard construction includes renewable wearing rings and water-cooled, ring-oiled bearings. Pump shown serves as a boiler feed unit in a large candy factory.



PRESSURES TO 250 psi. — Motorpumps: A complete line of space-saving centrifugal pumps, including both close-coupled and cradle-mounted types. Single , two-stage, and vertical four-stage models are available. Pump shown is handling boiler feed in a leather factory.

Ingersoll-Rand boiler feed pumps have many refinements in design and construction that add up to high operating efficiency. Skilled manufacture and painstaking factory inspections assure dependability built into every pump. Inherent simplicity and ruggedness mean easier and less maintenance—and trouble-free performance.

Whatever pressure or capacity you need, Ingersoll-Rand can supply a boiler feed pump for the job. I-R engineers will gladly help you select the pump that meets your needs.

Ingersoll-Rand

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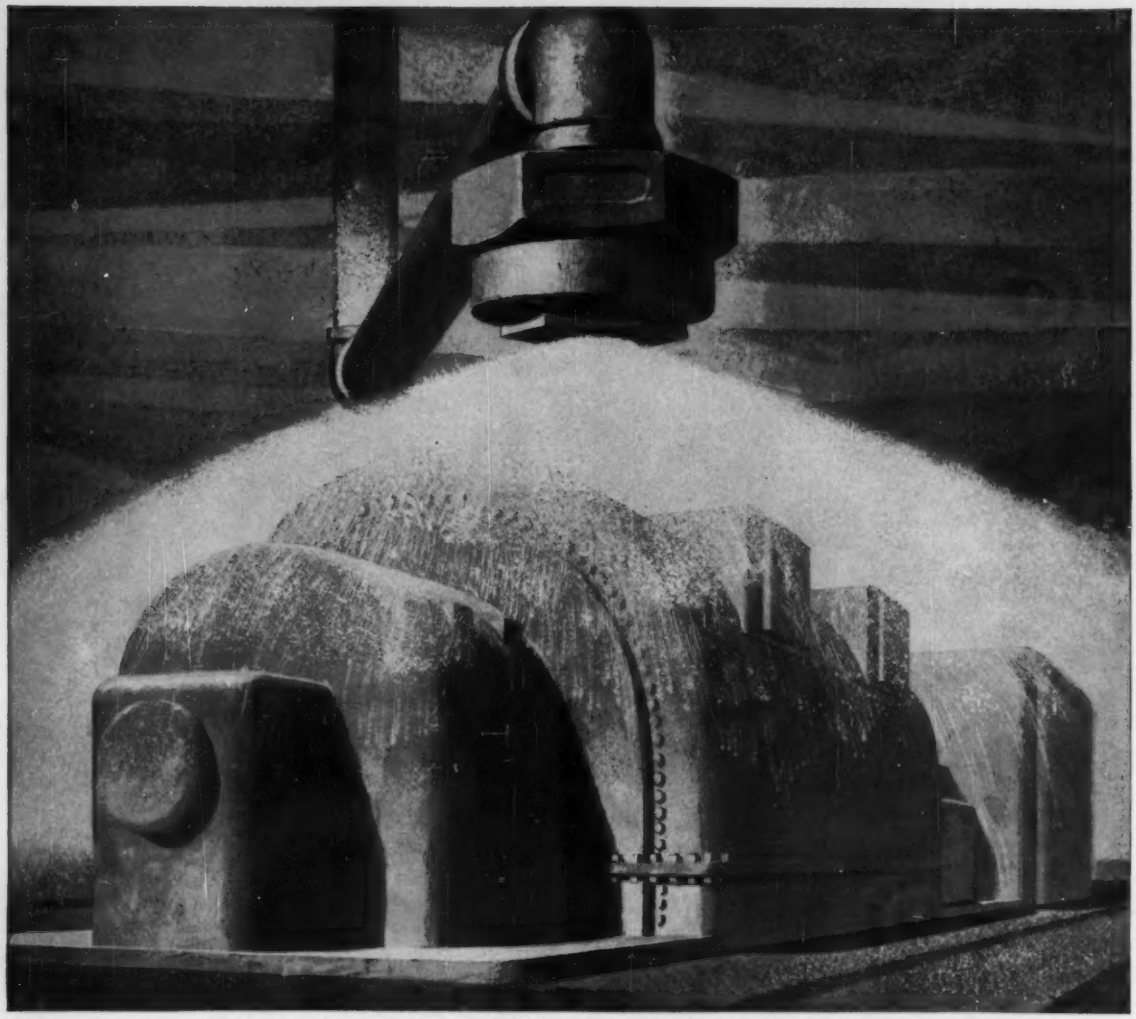

Underneath this turbo generator is the fuel and the heat for an instantaneous and costly conflagration

...give your equipment the best fire protection—

A BLAW-KNOX AUTOMATIC FOG SYSTEM

Engineered to give your generators and other equipment positive protection against fires, a BLAW-KNOX *Automatic* FOG SYSTEM goes into action immediately:

- *smothers flames*
- *dissipates heat*
- *protects adjacent equipment*
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- *avoids customer complaints*

"Little Joey Sprinkler" always on the job

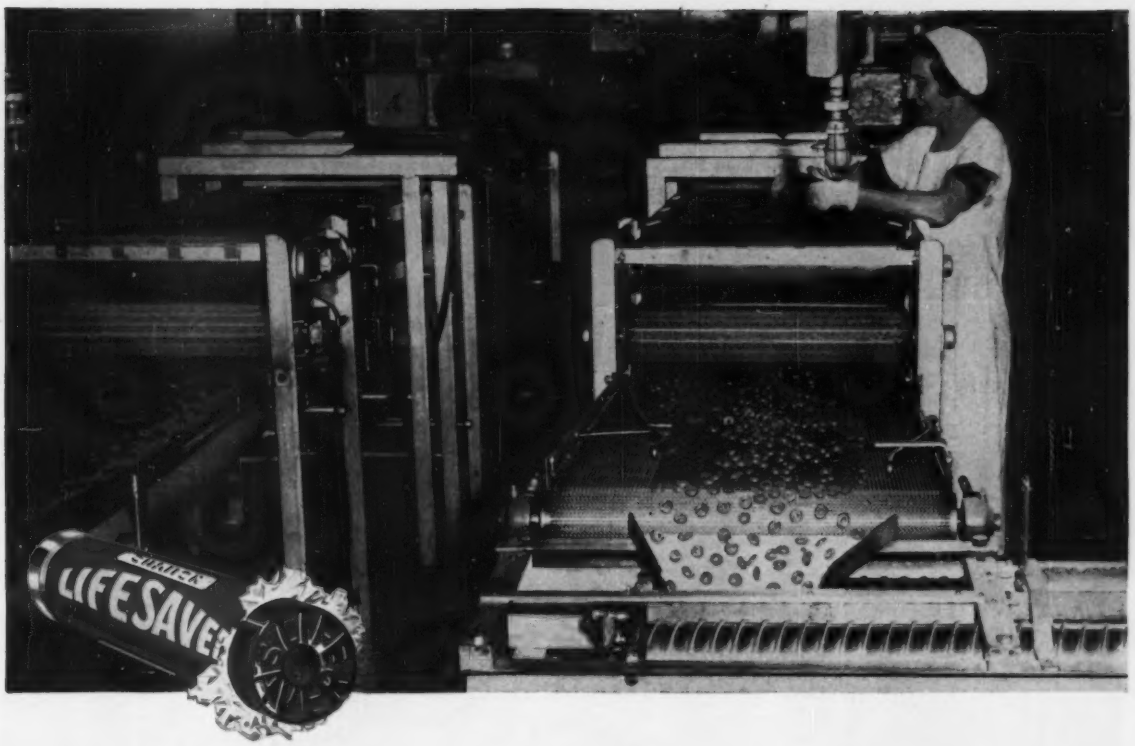
Why not give your equipment the BEST possible protection? Let a Blaw-Knox *fire-protection* Engineer study your needs. He will gladly submit a layout and a cost estimate . . . with no obligation to you.

50th Anniversary BLAW-KNOX 1906-1956

A BLAW-KNOX Automatic FIRE PROTECTION SYSTEM for EVERY NEED

BLAW-KNOX COMPANY

Automatic Sprinkler Department • Pittsburgh 33, Pennsylvania



CLARK Type "CY" Starters help Life Savers maintain pre-war price "...still only 5¢!"

Despite raw material and labor cost increases of several hundred percent since 1913, Life Savers Corporation has held the cost of their popular candy package to a nickel. *How?* By increased productivity and increased efficiency in production processes.

Practically all of the control equipment at the company's spotlessly clean, automatic Port Chester plant is by Clark. And, as worn out or outdated equipment is replaced, Clark is chosen. R. D. Farrant, chief electrician, tells one of the reasons why: "Clark starters have everything any other starters have, plus simplicity of changing all parts and ease of maintenance. I particularly like the way the arc shield drops down for easy inspection of contacts."

Write for complete information about the revolutionary Clark Type "CY" starters.

R. D. Farrant, chief electrician, checks installation of 20 Clark Bulletin 6013 Type "CY" size 1 starters on a new panel.

The **CLARK** **CONTROLLER** *Company*

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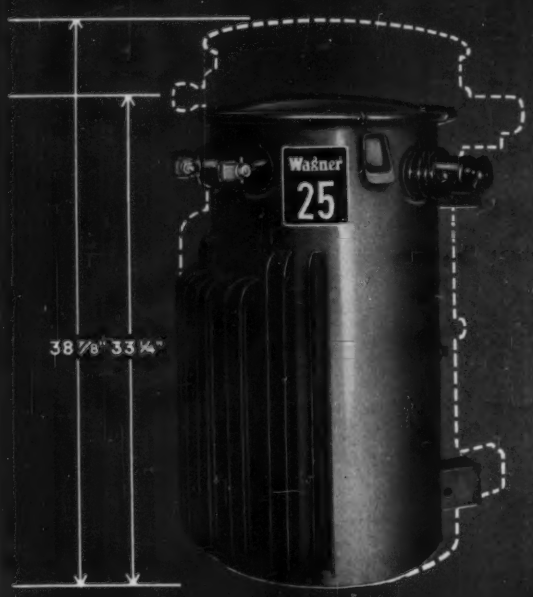
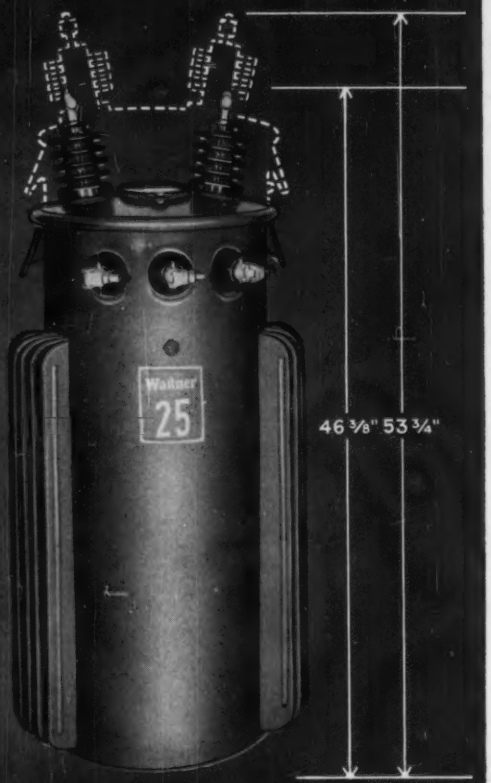
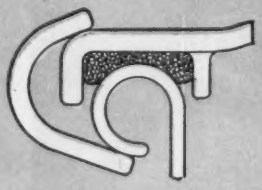
TRANSFORMERS

...the choice of leaders in industry





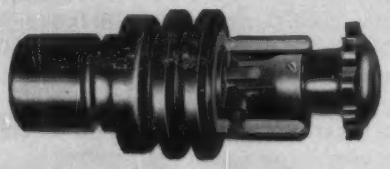
SHUR-SEAL CLAMPING RING



Keeps transformer sealed air-tight... no atmospheric moisture or dust particles can get inside. Spring action of lip and ring maintain pressure on gasket. Cover may be removed by loosening a single bolt.

HIGH VOLTAGE SIDEWALL BUSHING

For use with either copper or aluminum conductor... safety-designed for faster, easier connections, without tools. Porcelain and terminal are locked in position.



MECHANICAL FEATURES

The rating of each of these new transformers is clearly shown on the tank. There are fewer sharp edges and brackets on the tank where rust can start ... lifting lugs are curved and rounded.

In the 25, 37½ and 50 Kva ratings, cooling fins increase the radiating surface. The 75, 100 and 167 Kva ratings are provided with tubes.

Wagner

Distribution Transformers

smaller-lighter-easier to handle and install

Now Wagner Form W Distribution Transformers are substantially smaller and lighter than ever before... up to 25% shorter in the important overall height dimension—17% lighter in weight. Yet they are liberally designed for excellent electrical performance.

This means greater ease of handling—speedier installation. It also means that you can save money by putting greater transformer capacity on your existing structures... handle heavier loads without installing new poles. All these new Form W Transformers, in ratings 15 through 167 Kva, 15 KV and below, can be pole mounted.

Such reductions in size and weight are made possible by improvements in core and coil construction. A special resin coated insulating material is used for layer, channel and barrier insulation. Heat treating bonds this insulation to the coil conductors to give the coils exceptionally high mechanical and electrical strength.

These new, lighter shorter Form W Transformers will meet your distribution requirements. Consult the Wagner Sales Engineer in your area for complete information.

LOCKED LOW VOLTAGE BUSHING

The bushing and terminal are key-locked to prevent rotation... no loose terminal connections to cause internal shorts. Suitable for copper or aluminum conductor.

INHIBITED OIL

—reduces oxidation to a minimum... retards formation of acids and sludge.

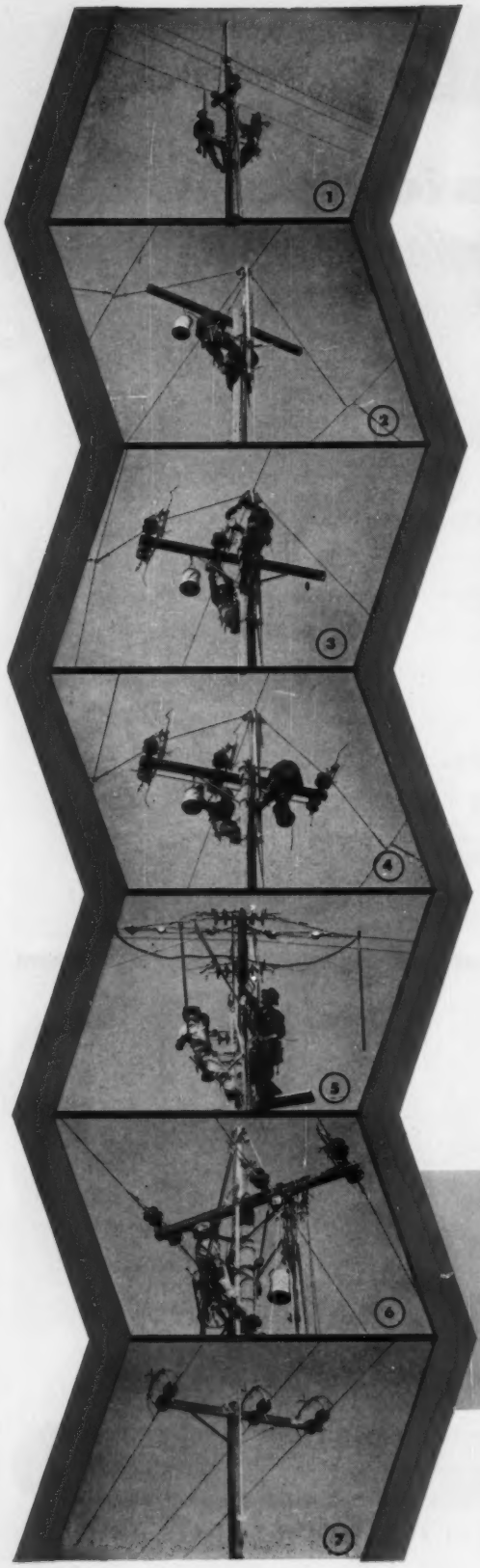
Wagner Electric Corporation EST. 1891

WAGNER ELECTRIC CORPORATION
6456 Plymouth Ave. • St. Louis 14, Mo., U. S. A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

T56-12



22 KV HOT LINE SWITCH INSTALLATION in less than 6 hours

A unique feature of KPF Air Break Switches is the ease with which they can be installed on hot lines. An important reason for this convenience is the simple design of KPF switches. They consist of two rigid dead end insulator assemblies with rigid jumpers forming the switch arms. One assembly is mounted stationary to the cross-arms. The other rotates to make and break the circuit. There are no complex parts to get out of order, require lubrication, adjustment or service. KPF switches serve indefinitely, are shipped ready for use requiring only bolting to the cross-arm and connection of conductors.

Pictures alongside illustrate a 22 kv hot line installation typical of those made regularly by leading power companies using KPF switches.

1. Line crew on job at 8:30 A.M. Gin pole installed and linemen start to untie and spread hot 22 kv line 3/0 copper. **2.** Line wires spread and new cross-arms installed for KPF switch. **3.** Switch being installed. **4.** Switch installed and adjusted ready to cut-in. **5.** Bypass jumper and blocks installed. Lineman about to deadend 3/0 copper into automatic deadend attached to KPF switch. **6.** Lineman lowering last conductor into position to be cut into switch. **7.** Switch complete and ready for operation. Time 3:10 P.M.

Get catalog, complete specifications. Write direct

KPF

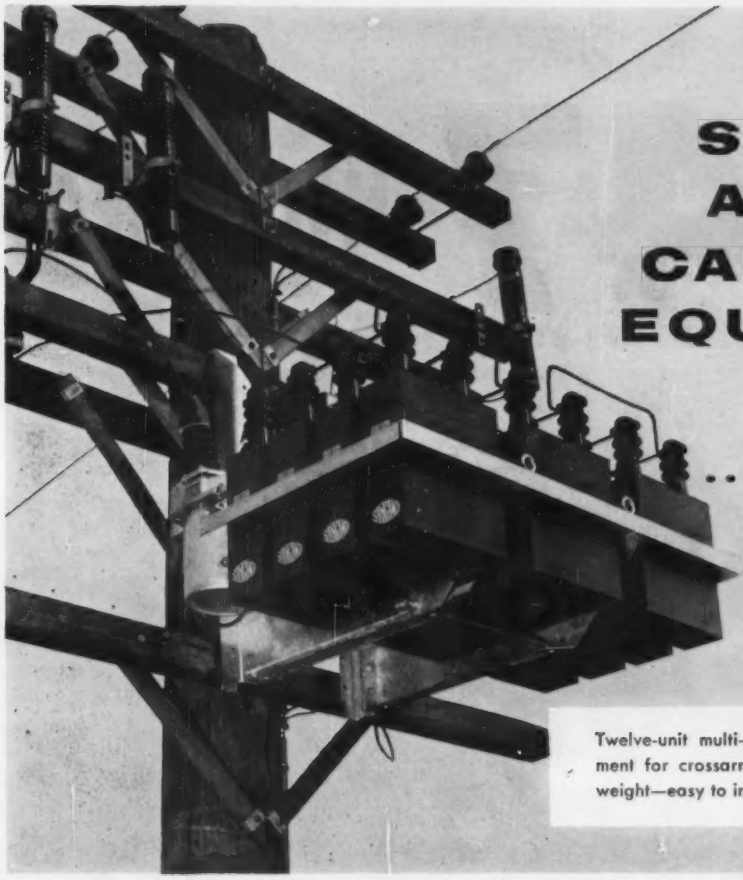
AIR BREAK SWITCHES

Standard for nearly half a century

KPF ELECTRIC COMPANY

DEPT. E • 1624 E. ALPINE AVENUE • STOCKTON 5, CALIFORNIA

3396



SANGAMO AUTO VAR CAPACITOR EQUIPMENT

low cost ...light weight ...quick and easy to install

Twelve-unit multi-row Auto Var Capacitor Equipment for crossarm mounting. Assembly is light in weight—easy to install on crossarm.

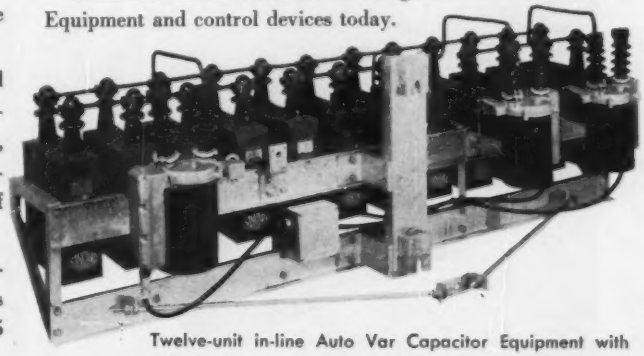
Sangamo Auto Var Equipment is completely assembled for automatic operation. It is wired at the factory. It enables capacitor installation on distribution circuits in amounts approximating peak load kilovars where permanent connection of such capacitors would be disadvantageous at light loads.

Both multi-row design for crossarm mounting, and in-line design for direct-to-pole mounting, are available. Equipment includes hot galvanized steel rack, capacitor units, electrically operated oil switches, junction box and all wiring. Switches can be omitted if desired.

Auto Var Equipment can be supplied in all distribution voltage ratings and with standard Kvar ratings ranging from 225 to 600 Kvar. Choice of either 25 Kvar or 50 Kvar individual capacitors.

Buy Sangamo Time Switches and Lincolntrols for automatic control of Auto Var Equipment as a function of time, volts, amperes, watts or vars.

Write for full information on Sangamo Auto Var Equipment and control devices today.



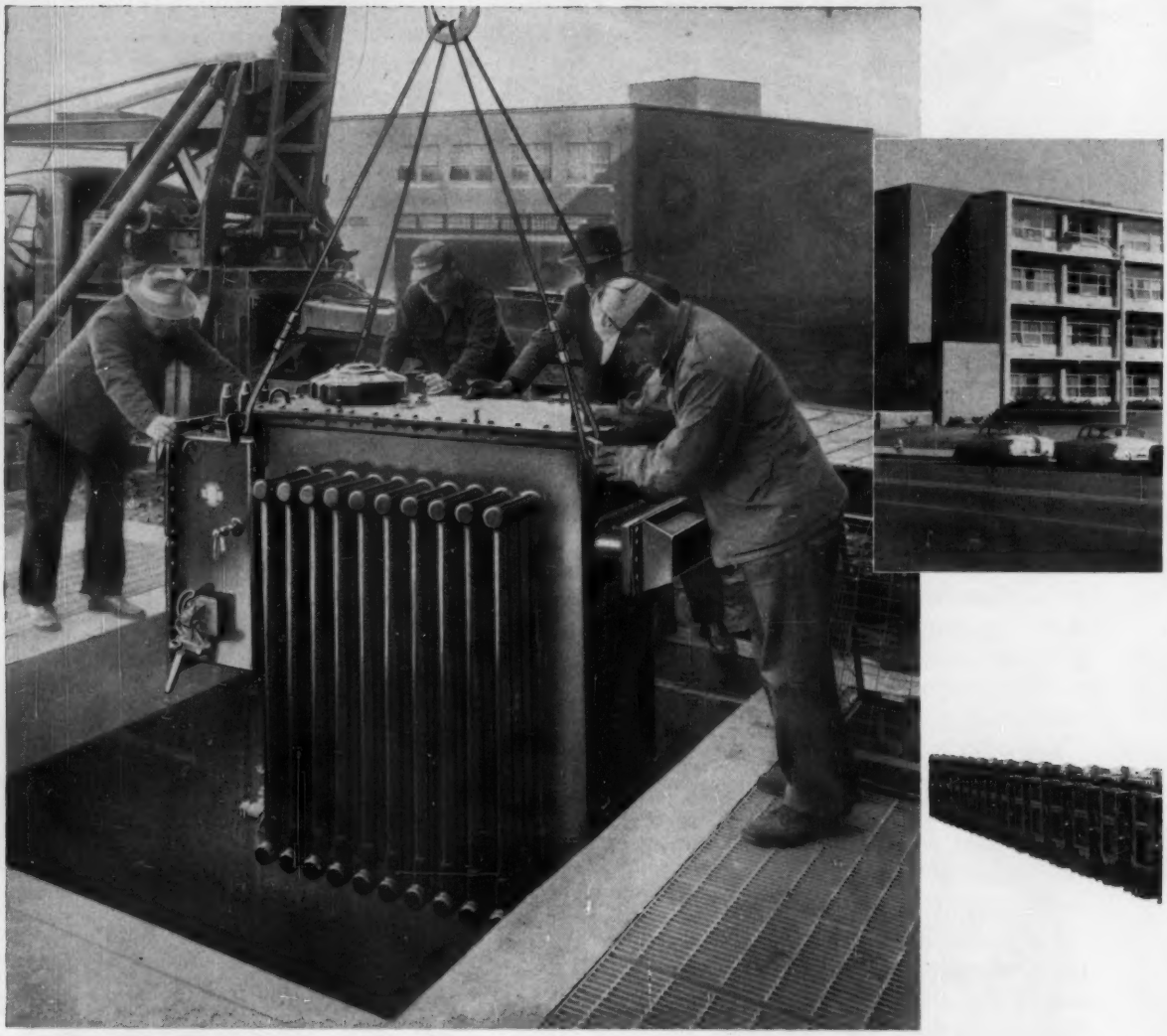
Twelve-unit in-line Auto Var Capacitor Equipment with electrically operated oil switches. Close coupling to pole gives low bending moment.

SANGAMO Electric Company

SPRINGFIELD, ILLINOIS

PC56-4

47 KUHLMAN



ONE OF THE 47 Kuhlman network transformers is shown being lowered below the street level. Each unit is a 500 KVA, 3 phase, 12480 Volt to 216Y/125 Volt submersible Saf-T-Kuhl type. A three position disconnecting and grounding switch is provided on the primary side for isolating or grounding the feeder cables during installation, testing and maintenance periods.

Specially engineered for network operation, Kuhlman's compact design saves vault space . . . reduces maintenance costs . . . withstands underground flooding and corrosive conditions.

NETWORK TRANSFORMERS

assure uninterrupted vital service for modern hospital area in Memphis

With nearly all of its hospital facilities growing and concentrated in one area, Memphis, Tennessee made careful plans for the future.

Memphis Light, Gas and Water Division engineers knew from experience that Kuhlman's dependability would meet the vital requirements of this modern hospital area. They also knew that a network system would protect service continuity under all operating conditions and offer low cost flexibility for future load increases.

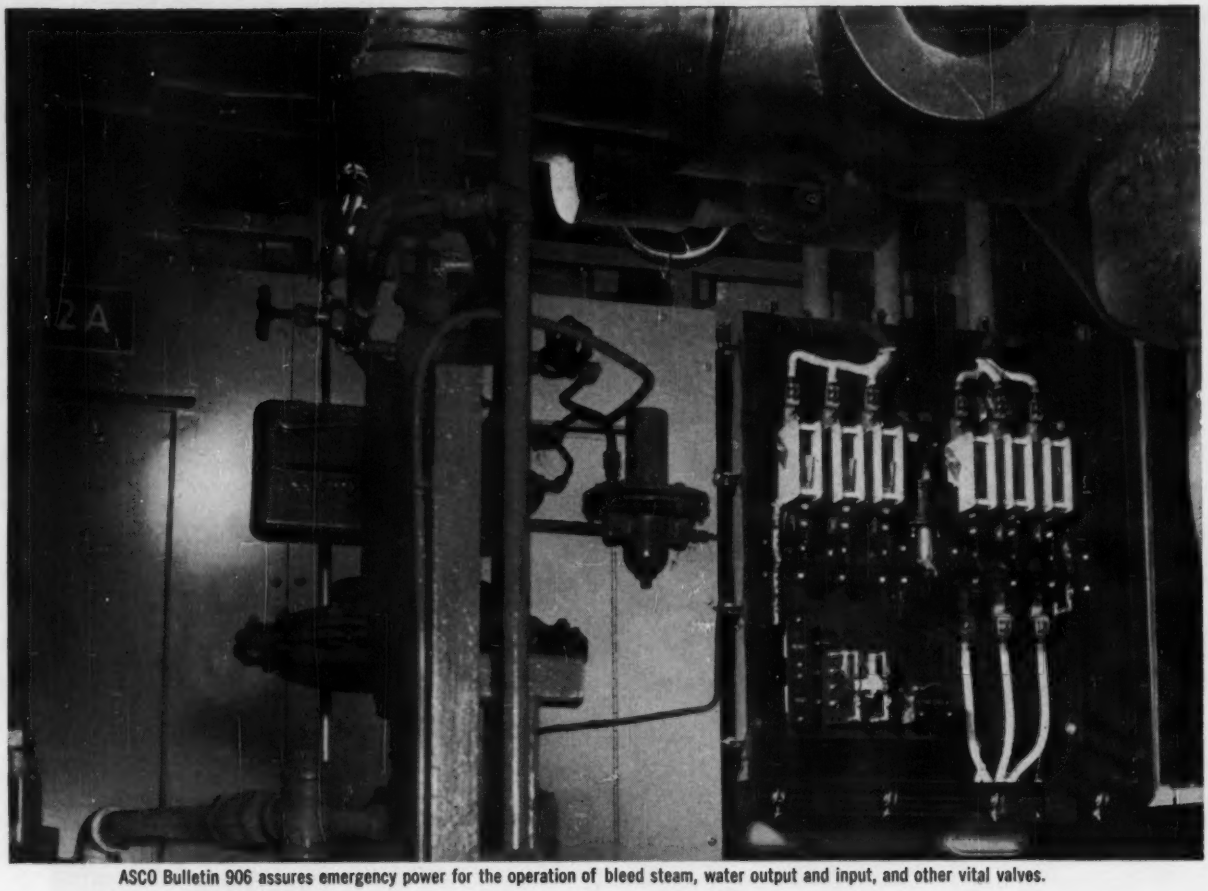
As a result, 47 Kuhlman 500 KVA network transformers were installed in a project requiring an initial investment of approximately a million dollars. These units replaced the City's underground system of transformers ranging from 50 to 150 KVA. Feeder lines were increased from 4 to 12 KV.

Like Memphis and other progressive communities, it will pay you to plan the future of your growing load areas with Kuhlman network transformers. Get all the facts—write or ask for Kuhlman network bulletin CS-1200.

5610

KUHLMAN ELECTRIC COMPANY

BAY CITY, MICHIGAN • CRYSTAL SPRINGS, MISSISSIPPI • SALINAS, CALIFORNIA



ASCO Bulletin 906 assures emergency power for the operation of bleed steam, water output and input, and other vital valves.

FOR ASSURED POWER

ASCO Automatic Transfer Switches
Protect Key Equipment
at Con Edison's Astoria Station

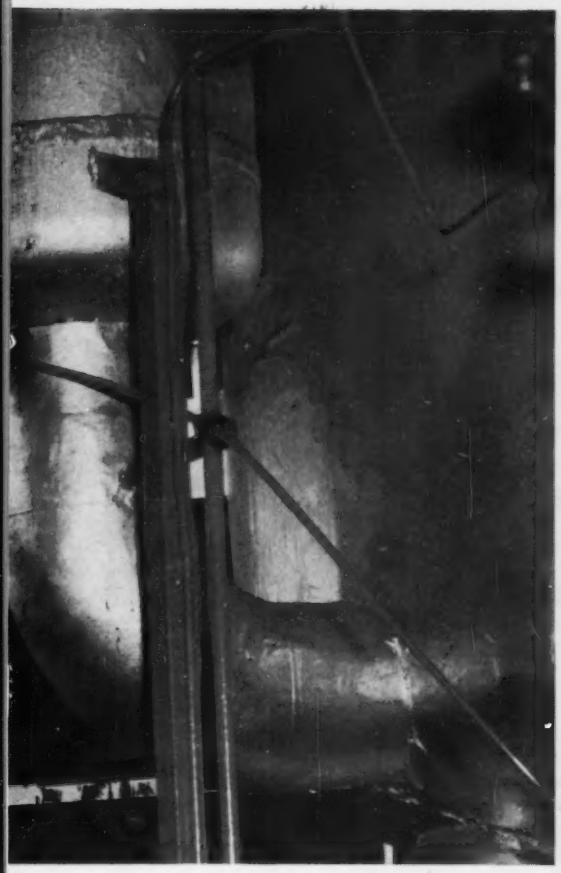
More than 50 ASCO Automatic Transfer Switches were specified by Con Edison for a variety of situations at its Astoria Generating Station, N. Y., where auxiliary power failure could not be tolerated. They protect generators, insure operation of key valves and control panels, stand ready at all times to transfer loads to alternate sources when normal power fails.

They must be dependable.

Dependability in an automatic transfer switch stems from several features. It must be designed for *continuous duty* in either normal or emergency position. The switch must be able to close safely on inrush currents 20 times full load rating so that contacts will not weld on tungsten lamp load.

Other features include *inherent* interlocking, precluding the possibility of both circuits being open or closed . . . *mechanical locking*, providing high contact pressure, minimum I^2R losses, and assuring that vibration or electromagnetic effects cannot open the con-

AUTOMATIC TRANSFER SWITCHES • SOLENOID VALVES • ELECTROMAGNETIC CONTROLS



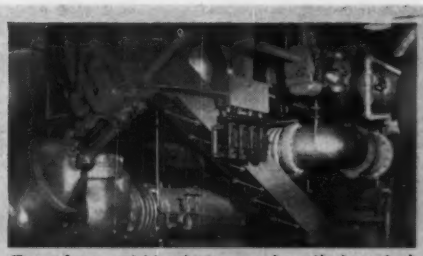
CONTINUITY

tacts . . . *single coil design,* providing construction simplicity, quiet operation . . . *built in time delay* so the equipment ignores harmless momentary outages.

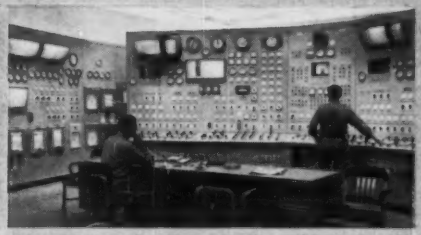
Only ASCO Automatic Transfer Switches satisfy all these essentials in addition to the nominal requirements of transfer switches. For this convincing reason, many engineers are today specifying ASCO — *the one source for a full line of absolutely dependable automatic transfer switches.*

WRITE NOW FOR PUBLICATION 596 DESCRIBING HOW TO SELECT AN ADEQUATE AUTOMATIC TRANSFER SWITCH.

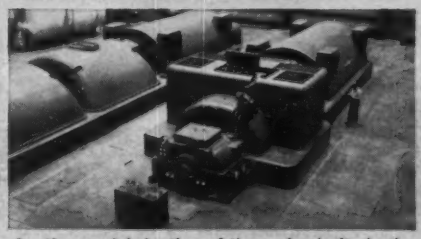
Automatic Switch Co.
397 LAKESIDE AVENUE
ORANGE, NEW JERSEY



Two of several bleed steam valves that control the flow of steam from turbines to the main condensers.



Power source for the operation of instruments on the control panel must not fail. Several ASCO units are used here.



Continuous lubrication of the main shafts in the turbo-generators is assured by auxiliary pumps shown in the photo below. The power for this equipment is assured by an ASCO Automatic Transfer Switch.

Inspector checks the oil level in the auxiliary lubricant pump for the generators.

ASCO®

DEPENDABLE CONTROL

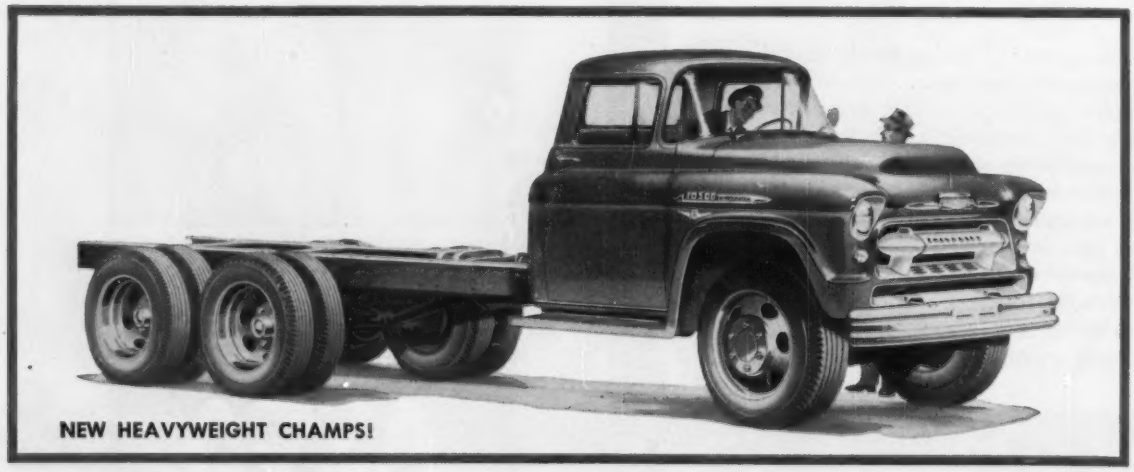
Now there's a great automatic for whichever Chevy truck you

Famous Chevrolet ***Hydra-Matic,*** or all-new ***Powermatic,*** provides easy, safe automatic driving that's tailored for your truck!

Pick *any* Chevrolet truck . . . and you'll find there's a modern automatic transmission to make your hauling easier, safer, and more profitable than ever!

For instance, if your choice is a Series 3000 or 4000 truck, there's ***Hydra-Matic.*** This modern automatic transmission eliminates manual gear shifting, gives you the ease of no-clutch hauling. It saves you maintenance money, too, because the hydraulic coupling protects universal joints, rear axle gears and shafts, rear tires and engine parts from shock loads. And, by automatically selecting the proper gear ratio for the road and load, ***Hydra-Matic*** gets you where you're going faster—saves you time!

Or, if your job calls for a 5000 through 10000 Series Chevy, there's exclusive ***Powermatic***—the first automatic transmission designed especially for big trucks! Unlike conventional or semi-automatic transmissions, ***Powermatic*** *works for you all the time.* Six fully automatic forward speeds and a torque converter virtually eliminate manual gear shifting on hills! A revolutionary "retarder" assures

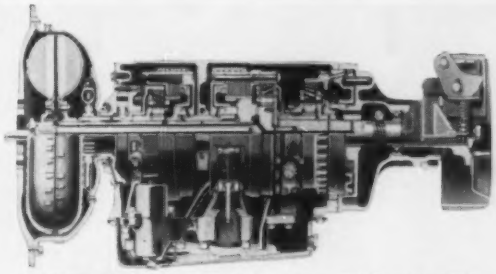


NEW HEAVYWEIGHT CHAMPS!

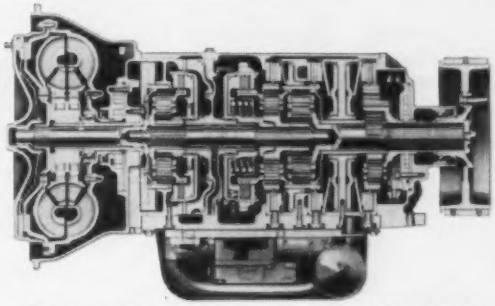
CHEVROLET **NEW CHEVROLET**

Anything less is an

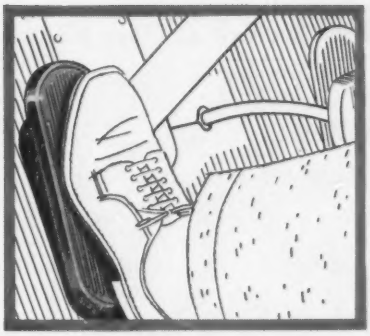
transmission choose



Hydra-Matic—optional in Series 3000 and 4000 trucks—brings new ease to tough jobs, cuts hauling time and maintenance expense.



Powermatic—optional in Series 5000-10000 models—assures the easiest, safest big-truck operation ever known! It's a Chevrolet "first."



Exclusive *Powermatic* **Retarder** makes downhill hauling safer, saves brakes! Most hills can be descended without touching the brakes . . . and most normal slowdowns can be made by the retarder alone!

safer downhill hauling, far less brake wear. You'll make better time through traffic because all shifts are "power-on" shifts. And ***Powermatic*** is designed to aid top-notch economy on the highway!

And Chevrolet truck *conventional* transmissions are great performers, too! For extra pulling power in medium- and heavy-duty models, Chevrolet provides big, rugged heavy-duty 4-speed Synchro-Mesh transmissions, or brand-new "New Process" 5-speed transmissions!*

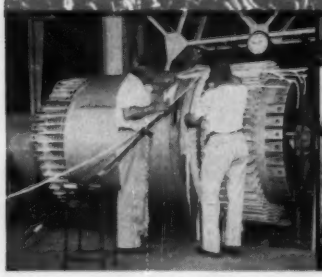
This wide selection of advanced transmissions is one more reason why Chevrolet trucks serve you better, one more reason why you should see your Chevy dealer soon! . . . Chevrolet Division of General Motors, Detroit 2, Mich.

**Optional in 5000 through 8000 Series models, standard in 9000-10000 Series models.*

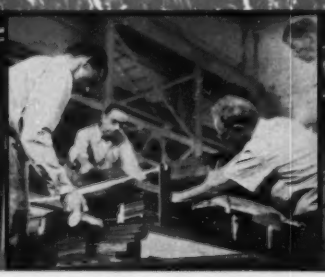
NEW MIDDLEWEIGHT CHAMPS!

TASK·FORCE TRUCKS

old-fashioned truck!



Coils are designed by experts and wound by craftsmen to provide windings that withstand surges and overloads of actual service.



Core steel is stacked carefully with sufficient oil ducts to eliminate hot spots.

Core laminations for upper header are installed after coils are mounted over core legs.

Moisture is removed from core-and-coil units by dehydration—without impairing insulation life.

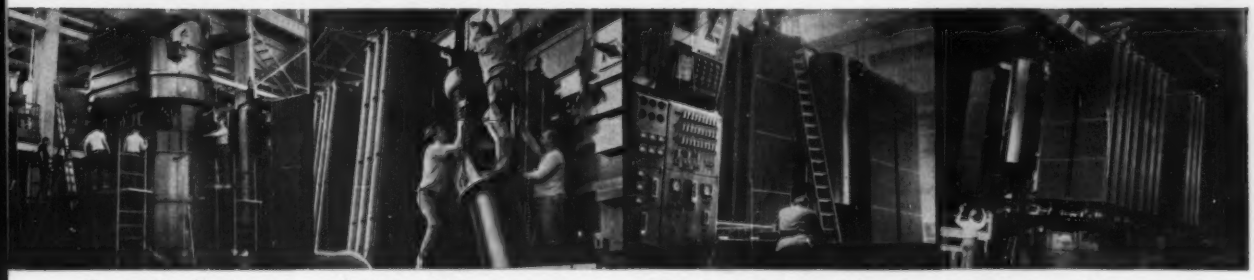
Ask them, any one of them, and they'll
all tell you the same thing. Stars don't win every game;
it takes real team work to do a winning
job . . . consistently.

. . CAN'T BE WRONG!

That's why Moloney emphasizes teamwork. Every step of
the way, from planning and designing to fabrication and testing,
Moloney's people work as a team. It's the best way to
produce dependable transformers that do a winning job . . .
consistently . . . for your utility system.

MEDS-56

Specify Moloney . . . Get Dependability at its Best . . . All Along the Line



Core-and-coil units are quickly sealed in tanks, while still warm from dehydration process, to prevent absorption of moisture.

Bushings, radiators, gauges and accessories are installed before transformers are tested, assuring proper operation of transformers as complete units.

Tests to assure dependable performance and proper operation, according to your specified requirements, are made by competent transformer engineers.

Complete transformers, ready for delivery, are well designed, skillfully fabricated and thoroughly tested, assuring long life and dependable performance.

MOLONEY ELECTRIC COMPANY

Power Transformers • Distribution Transformers • Load Tap Changing Transformers • Regulating Transformers • Step Voltage Regulators • Primary Unit Substations Secondary Unit Substation Transformers • Network Transformers • Series Street Lighting Transformers Subway Transformers • Industrial Dry Type Transformers • Capacitors Magnetic Components For Electronics

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

malleable iron

is the one available *low cost link* by which material strength and corrosion resistance can join designing and engineering to give

pole hardware

Longer Life

MIF *longer life* pole hardware costs no more, and often less, than carbon steels — and far less than special, non-corrosive, premium priced steels.

MALLEABLE IRON FITTINGS COMPANY
Pole Hardware Division **Branford, Connecticut**
N. Y. Office: 30 Church St.

Canadian Mfr. & Dist.: LINE & CABLE ACCESSORIES, Ltd. TORONTO

Representatives: William J. Cottrell Co., Portland, Ore. • James H. Drew Corp., Indianapolis, Ind. • Industrial Engr. & Equip. Corp., Los Angeles, Cal. JSG Electric Co., Chicago, Ill., Lee-Smith Co., Miami, Fla. • B. H. McCoin, Knoxville, Tenn. • William J. O'Brien, Memphis, Tenn. • Robert P. Smith & Co., Jacksonville, Fla., E. A. Thornwell, Inc., Atlanta, Ga. • J. P. Voight, Summerville, S. C. • Waltham, DeWitt & Krusi, San Francisco, Cal. • L. G. Wendegatz, Kansas City, Mo. • Williamson Sales Co., Shreveport and New Orleans, La.; Dallas, Houston, Tex.; Pine Bluff, Ark. • O. C. Witte Co., Detroit, Mich.

THE CUTOUT THAT TAKES HEAVY FAULTS IN STRIDE!

SOUTHERN STATES NEW TYPE 33-F

Engineers know that when a heavy fault hits a cutout, powerful shock forces are created. A large volume of gas is generated instantly, developing extremely high pressure inside the tube. For an instant the life of the cutout depends on its ability to absorb and dissipate the concentrated energy.

The new Southern States Type 33-F is engineered to take this critical stress in stride!

In less than half a cycle a tremendous volume of gas is expelled from *both ends* of the 33-F tube. No components project into the vent zone to interfere with the rapid discharge of gases. There are no "pockets" to trap and deflect any of the high velocity gases. *This prevents ricochet flashover.*

Every part and parcel of the 33-F is designed to withstand repeated jolts without damage—assuring positive circuit protection and a cutout ready for quick re-fusing instead of replacement.

For a simple, rugged cutout that you can depend on under ever increasing system capacities, choose the Southern States Type 33-F.

NOTE TO USERS OF SS 33-D and 33-DH CUTOUTS

Either of these types on your system can be converted for higher short circuit duty by simply replacing the fuse holder, as long as the continuous rating of the installed cutout is not exceeded.

CHECK THESE INTERRUPTING RATINGS

TYPE 33-F		
KV	CONT. AMPS.	RMS AMPS. INT. CAPACITY
5	100	8,000
7.5	100	8,000
15	100	6,000
25	100	3,000

TYPE 33-FH		
KV	CONT. AMPS.	RMS AMPS. INT. CAPACITY
5	100	10,000
5	200	10,000
7.5	100	10,000
7.5	200	10,000
15	100	8,000
15	200	8,000
25	100	4,000

INTERCHANGEABLE FUSE HOLDERS

The fuse holders are interchangeable between Types 33-F and 33-FH.

SS®

SOUTHERN STATES EQUIPMENT CORP.

HAMPTON, GEORGIA

IN CANADA: Dominion Cutout Co., Ltd., Toronto

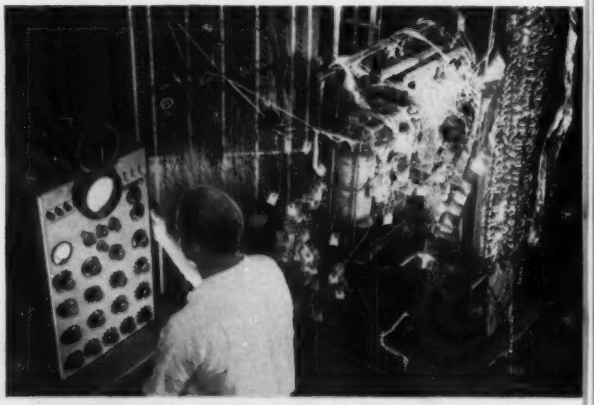
OPTIMUM INVESTMENT*
Power Transformers

*Optimum Investment

Your assurance of lower long-term cost, plus greater dividends from your investment in General Electric large power transformer, through:

- **LOW ENGINEERING COST:** G-E field services reduce your engineering expense.
- **LOW PURCHASE COST:** Skill to produce optimum design for each application.
- **LOW INSTALLATION COST:** Upright shipment, one-piece tank speeds handling.
- **LOW OPERATING COST:** Permanent, better characteristics for lasting economy.
- **LOW MAINTENANCE COST:** Product improvements, greater reliability reduce outages.

INTERNAL THYRITE®, an amazing non-linear resistance material, gives ideal overvoltage protection to partial or complete sections of transformer windings. Located next to and connected in parallel with the coil, Thyrite acts like a safety valve and by-passes excessive currents and voltages.



ELECTROMAGNETIC MODEL determines impulse voltage distribution in a transformer before the actual unit is built. Due to remarkable similarity in characteristics between model and completed transformer, the unit can then be built with the correct amount and location of insulation.

Improvement of Power Transformer Design Features Leads to . . .

A 300% INCREASE IN RELIABILITY; UTILITY SAVINGS OF $10,000,000 IN 1955

Product improvements speed trend to three-phase units, reducing utility capital investment in transformers

How reliable are today's power transformers? A recent study indicates that General Electric power transformers have become three times more reliable in just twenty years.

ANALYSIS OF RECORDS was made to determine how many transformers, 15,000 KVA and above, succumbed to lightning or faults within the first five years of service. Transformers built in two periods—1928 through 1930, and 1948 through 1950—were compared. G-E records show that the number of failures, already small, was further reduced by 75% on the basis of the number of units shipped, and 84% on a KVA-shipped base. Also, since 1950, further product improvement has reaffirmed this 300 per cent increase in power transformer reliability.

During the late '20's, many installations consisted of single-phase, rather than three-phase units. As transformers became more reliable, the trend to three-phase installations grew, saving users of General Electric power transformers over $10,000,000 in 1955 alone—comparing units actually purchased to what would have been bought based on the utility practices of the late '20's.

EXTENSIVE DEVELOPMENT of new and better G-E power transformers features has keynoted this trend. For instance, Thyrite* resistors help guard against winding overvoltages caused by line surges; electrostatic shielding helps prevent damage from lightning impulses; electromagnetic models assure the use of proper impulse-resisting insulation; and special core and coil bracing keeps the unit rigidly strong. All contribute to improved reliability.

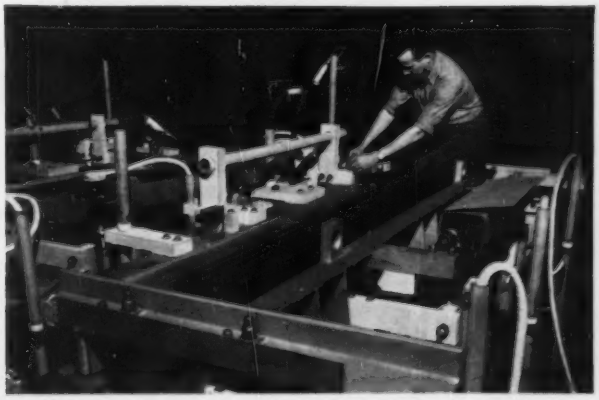
These are examples of features designed to reduce your maintenance costs. There are more. And, combined with other features that give you low engineering, purchase, installation, and operating costs, they make your General Electric Power Transformer an *Optimum Investment.* General Electric Co., Schenectady 5, N. Y. 421-44

*Registered Trademark of General Electric Co.

Progress Is Our Most Important Product

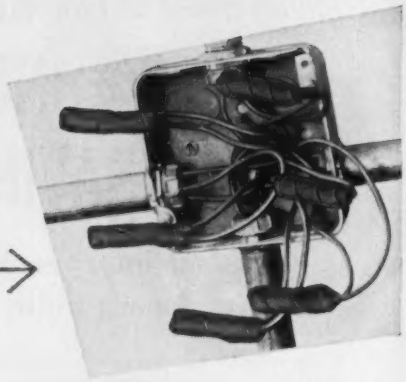
GENERAL ELECTRIC

ELECTROSTATIC SHIELDING combats the tendency of lightning-caused impulse voltages to overstress the insulation by distributing themselves across only a few turns of the winding. Shielding evens out the voltage distribution throughout the winding and helps prevent insulation breakdown.



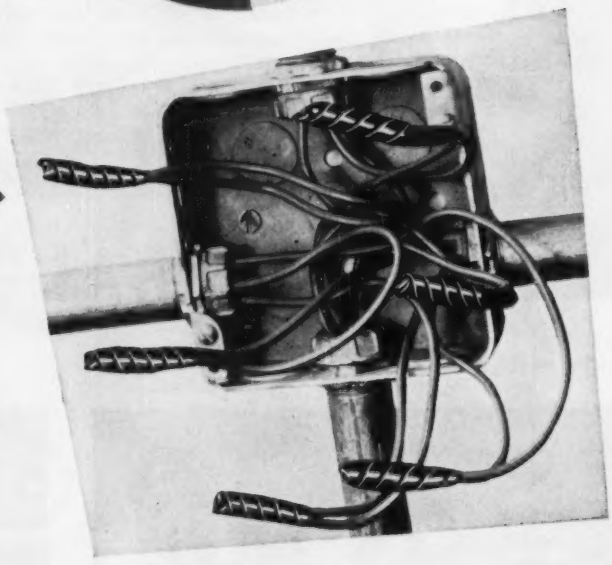
CORE AND COIL CLAMPING forms a rigid, compact structure of the myriad of component parts of the assembly. As surges and fault currents course through a transformer, exerting severe stresses on the assembly, the clamping resists these forces and helps protect the assembly from being distorted or damaged.

Avoid this



use this

for results like this . . .



For neat, sure insulation without bulk, use Porter vinyl electrical tape. One operation does the job. No outer wrapping needed. Dielectric strength stands up to high voltages. Resistant to acids, water, corrosion. Conforms readily to curves. Retains adhesion under toughest service conditions. Ideal for production line and maintenance work. Order from your Quaker distributor.

Porter Vinyl Electrical Tape carries Underwriters' Laboratories Inc. seal

HKP
A DIVISION OF H. K. PORTER COMPANY, INC.

QUAKER RUBBER DIVISION
PHILADELPHIA 24, PA. • SAN FRANCISCO 7, CALIFORNIA
H. K. PORTER COMPANY, INC.

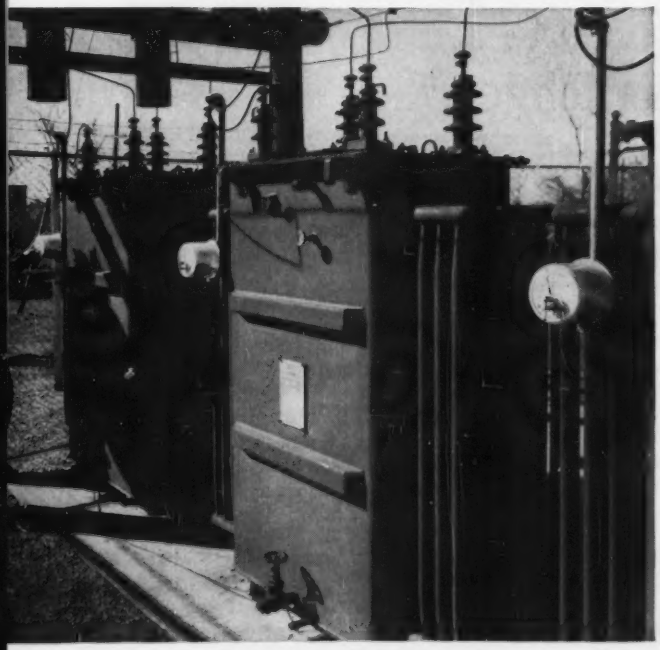
A V2JS VOLTMETER-WATTHOUR METER COMBINATION permanently installed at first or last customer from the transformer. Regular meter reader reports minimum and maximum voltage to Engineering Department.

COMPLETE TEST SET checks load and voltage at customer's premises —gives full information on circuit conditions at input to customer service, while continuing to record KWH consumption.

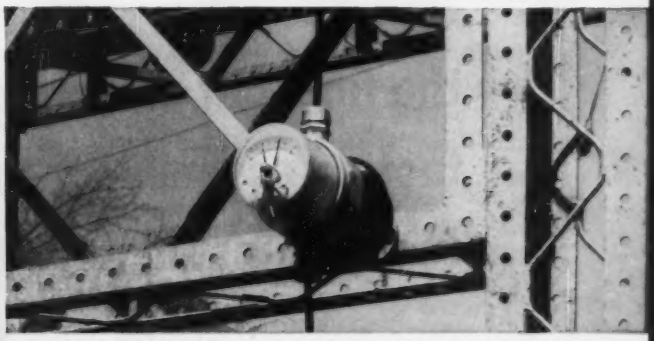
for better knowledge of your system ...use Lincoln Meters!

Indicating meters provide the low-cost way of obtaining complete knowledge of your system. They give continuous data of load, balance, and current values—on transformers, on feeders, at substations, at system check points. Lincoln Indicating Meters are simple in design and operation—flexible in application. Use the coupon below for detailed information on these economical aids to system betterment.

SANGAMO ELECTRIC COMPANY, Springfield, Illinois



LINCOLN ADN AMPERE DEMAND METERS, tied solidly in to the neutral, provide continuous knowledge of load and balance on 4WY banks of transformers. No instrument transformers are required.



THIS "HOT" TYPE AD-5 LINCOLN METER indicates amperes and gives balance on primary feeder circuits. Meter is insulated from ground with a post-type insulator and is arranged for hot stick reset.

SANGAMO ELECTRIC COMPANY, Springfield, Illinois

Please send me the information checked below:

- ☐ Information on Lincoln Voltmeters and Ammeters.
- ☐ Bulletin on Test Sockets.
- ☐ Booklet: "Solving Distribution Problems through Measurement."

NAME_____

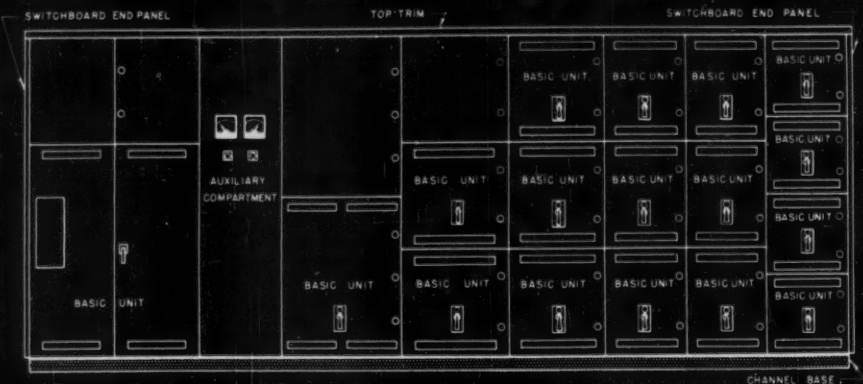
COMPANY_____

ADDRESS_____

CITY_____ STATE_____

SM56-6

I-T-E Low Voltage Switchgear



--the finest of modern switchgear factory assembled, shipped as a unit, ready to install in your plant

I-T-E Low Voltage Switchgear provides the optimum in dependability, safety, reduced maintenance costs, and attractive appearance. I-T-E Circuit Breakers have proved their worth in thousands of applications. I-T-E Structures are designed specifically to house and interconnect these time-proved protective devices and auxiliary equipment. When you combine the two, you have the finest of circuit breakers in the finest of structures. And you get the additional advantages of less special engineering, faster delivery, and units custom-made in standard frames to fit your requirements.

For complete information, consult your nearest I-T-E sales office. Or write I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa.

I-T-E CIRCUIT BREAKER COMPANY • Switchgear Division

Buried 15 Kv high-voltage cable

gets lasting protection with Du Pont ALATHON®

ALATHON® 4 for jacketing offers high impact strength, exceptional outdoor durability and superior resistance to stress cracking.
Shielding tape
ALATHON® 5 for primary insulation is unpigmented, has a low power factor and dielectric constant which remain essentially unchanged over the entire range of frequencies.
DANGER
HIGH VOLTAGE
KEEP AWAY
DANGER
CABLE BURIED HERE

Cable supplied by Anaconda Wire & Cable Co., New York, N. Y.

A cable operating at 15 Kv underground must be constructed with insulation and jacketing which assure lasting, trouble-free protection. The insulation must have exceptional dielectric strength and the jacketing must have outstanding resistance to mechanical damage, chemical action and moisture. When a large eastern chemical company needed such a power cable for their new testing laboratory, they specified insulation and jacketing of "Alathon."

Du Pont "Alathon" polyethylene resin features low power loss and low dielectric constant, toughness and flexibility, even at extremely low temperatures, and outstanding moisture resistance. With insulation or jacketing of "Alathon," you get cable that is light in weight, flexible and easy to handle. Installation is speeded by its ease of pulling, cleanness in handling, and simplified jointing and terminating requirements.

To get complete property and application data on "Alathon," clip and mail the coupon below.

There is a difference in polyethylenes —

specify **ALATHON®**
polyethylene resin

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Department,
Room 356 Du Pont Building, Wilmington 98, Delaware
In Canada: Du Pont Company of Canada Limited,
P. O. Box 660, Montreal, Quebec.

Please send me complete information on Du Pont "Alathon" polyethylene resins. I am interested in evaluating these materials for

_____

Name_____

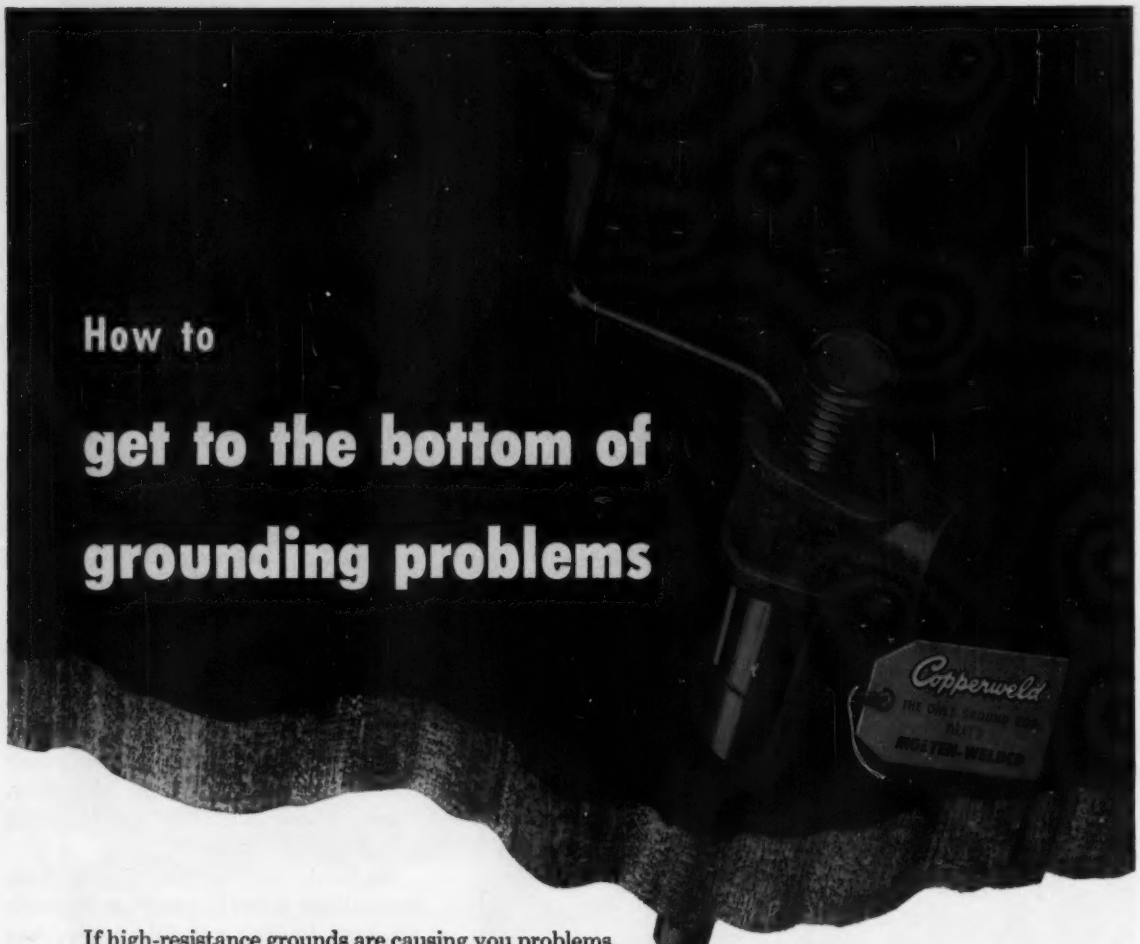
Position_____

Firm Name_____

Street Address_____

City_____ State_____

Type of Business_____



How to

get to the bottom of grounding problems

If high-resistance grounds are causing you problems, here's a simple, low-cost way to solve them. Drive Copperweld* Sectional Ground Rods deep into the earth's sub-surface to reach permanent moisture, where resistance is always low.

By using this proved, practical method, you'll have dependable grounding protection every day in the year. And then you can be certain you'll always get the best performance from the protective equipment on your overhead systems.

*Trade Mark

COPPERWELD STEEL COMPANY
WIRE AND CABLE DIVISION *Glassport, Pa.*
For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York

GO DEEP with Copperweld TRADE MARK **sectional ground rods**

PERMANENT MOISTURE

Silent Partner

The "Rancho Park" branch of the California Federal Savings and Loan Association installation of the Sunbeam 4' x 4' recessed luminous squares by Sunbeam Lighting Company, Los Angeles, California.

EFFICIENCY • ENDURANCE • ECONOMY

To receive peak performance from fluorescent lighting it is most essential that the ballast . . . the heart of a fluorescent fixture . . . match precisely the electrical requirements of the lamp it has been designed to operate. The fluorescent lamp ballast should have endurance to supply years of quiet, trouble-free service and it must provide economy of operation.

ADVANCE fluorescent lamp ballasts are synonymous with *Efficiency, Endurance, Economy.* ADVANCE ballasts are the result of extensive engineering, research and precision manufacturing methods, enabling us to produce in volume the most complete line of fluorescent lamp ballasts in the world . . . and back each ballast with a two-year guarantee. Whether you manufacture, specify, install or maintain fluorescent lighting make ADVANCE your Silent Partner and be assured of the most efficient, longest lasting, economical fluorescent lamp ballasts you can use.

The Heart of the Lighting Industry

ADVANCE

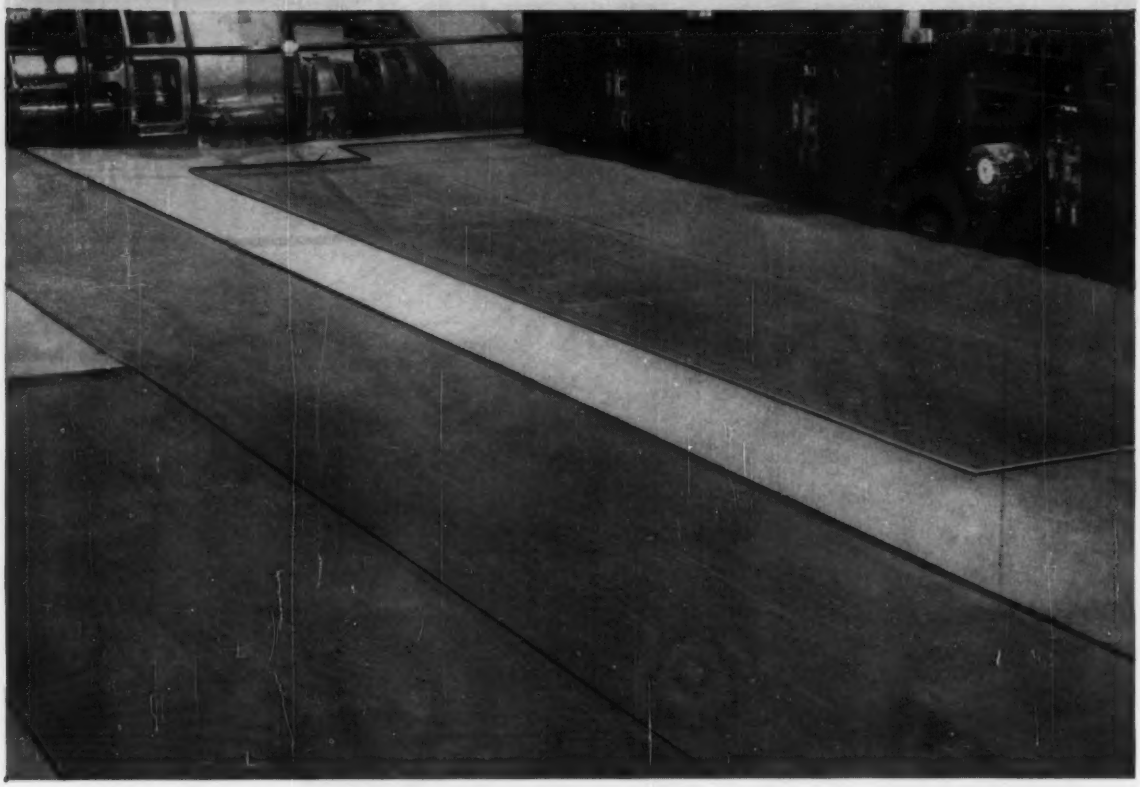
CBM CERTIFIED

World's Largest Exclusive Manufacturer of Fluorescent Lamp Ballasts

TRANSFORMER CO.

2950 No. Western Ave. Chicago 18, Illinois

Insulate electrical apparatus with U. S. Switchboard Matting



Service at indicated voltage guaranteed!

Factories, mines, utilities, and railroads who must insulate electrical equipment against dangerous voltages find U. S. Switchboard Matting does a full protective insulation job. It has been tested over ***entire areas*** with stated potential to *guarantee service at indicated voltage.*

Style E-9838

U. S. E-9838 Switchboard Matting has been electrically tested in accordance with A.S.T.M. Spec. (D178-24), spot-tested for 40,000 volts dielectrical strength or better, proof-tested at 15,000 volts over the entire area and recommended for use up to 3,000 working voltage.

In addition, U. S. E-9838 Switchboard Matting is stenciled on the back – every three (3) feet as follows: "Electrically tested in accordance with A.S.T.M. (D178-24)"

Style E-2306

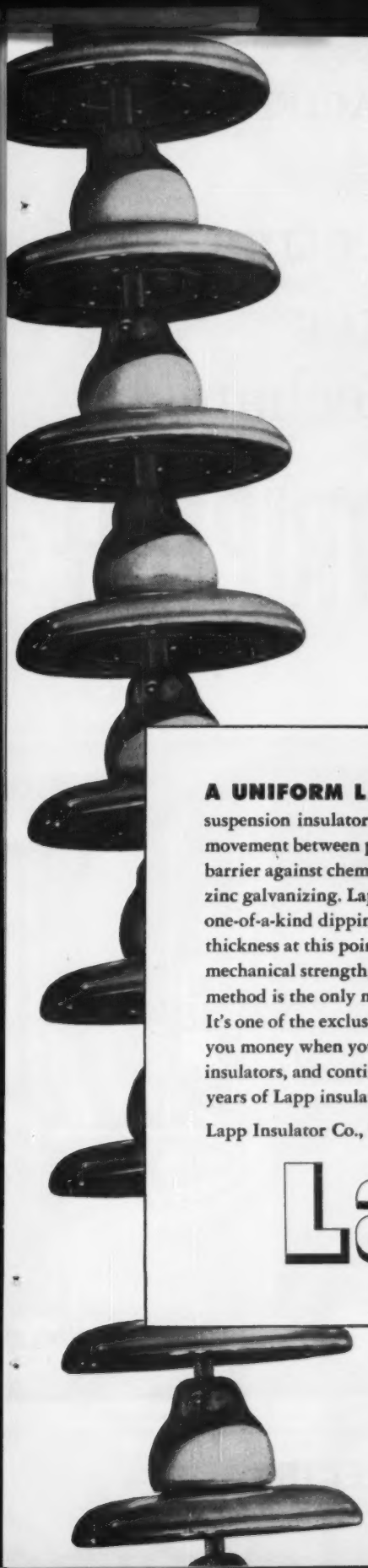
U. S. E-2306 Switchboard Matting has been electrically spot-tested for 20,000 volts and dielectrically proof-tested at 7,500 volts and recommended for use up to 1,500 working voltage. In addition, this grade is stenciled on the back – every three (3) feet as follows: "Electrically tested and recommended for 1,500 working voltage."

Obtainable from any of United States Rubber Company's selected distributors or any of the 27 "U. S." District Sales Offices, or write to us at Rockefeller Center, New York 20, N. Y.

US RUBBER

Mechanical Goods Division

United States Rubber

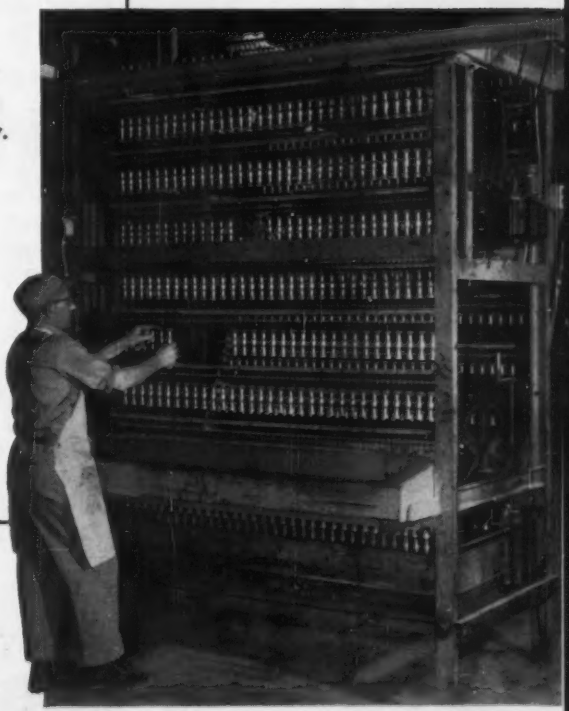


MOST FOR YOUR MONEY in high voltage insulation. Today's Lapp suspension discs are the best insulators of this design we have ever made. Their quality—and their low price—are the result of automation and control in manufacture. Their uniformity is your guarantee of their performance—in mechanical strength, electrical permanence, long life.

A UNIFORM LAYER of resilient paint on the suspension insulator pin provides a cushion for thermal movement between pin and cement porcelain head—and a barrier against chemical action between cement and zinc galvanizing. Lapp designed and built this one-of-a-kind dipping machine because paint thickness at this point is a critical factor in insulator mechanical strength, and because such an automatic method is the only means for assuring its uniformity. It's one of the exclusive Lapp techniques that save you money when you buy Lapp suspension insulators, and continue to pay off over long years of Lapp insulator service.

Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp



FEDERAL PACIFIC GIVES YOU

self-protecting* oil circuit breaker operating mechanism

ALWAYS 100% TRIP FREE

FPE
FEDERAL PACIFIC ELECTRIC

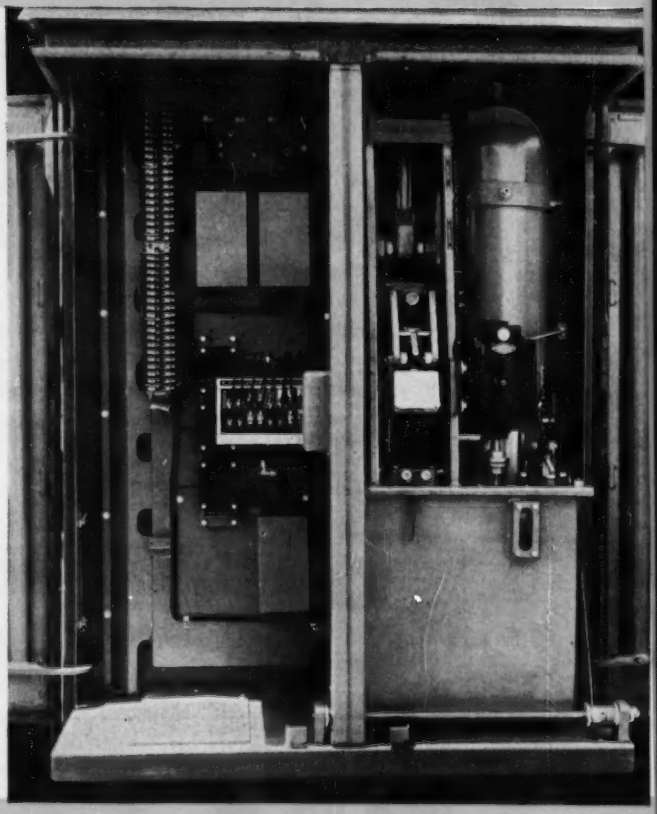
*automatic supervision

Automatic supervision of the hydraulic system protects the breaker against mis-operation.

highest safety factor

The smoothness of operation is such that the breaker may be operated repeatedly without oil in the tanks...thus demonstrating the highest mechanical safety factor.

For details of the Type OA Operating Mechanism write for Catalog No. 4-587: Pacific Electric Switchgear Division, 5815 Third Street, San Francisco, California.



Finest Products Engineered

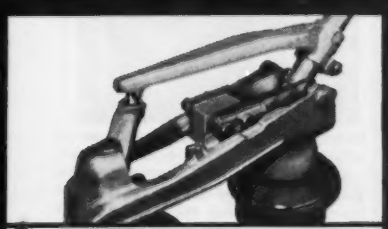
FEDERAL PACIFIC ELECTRIC
COMPANY
50 Paris Street, Newark 1, N. J.

vertical-break versatility

announcing the new

FEDERAL PACIFIC ELECTRIC

TG-O AIR SWITCH



Single-Link Simplicity—Only one moving link connects the arm at the top of the rotating insulator with the blade assembly—the simplest and most efficient enter-turn type mechanism.

Single-Pole Switch Unit—In the closed position.

The new TG-O Vertical-Break Air Switch **is designed so that it may be stocked by utilities for immediate field installation over a wide range of conditions.**

The new TG-O has proven to be outstandingly efficient under the most severe icing conditions. The large force leverage near the end positions and the shape of the parts at the hinge and clip ends assures progressive shattering of ice without cantilever stress on the insulators.

The versatile TG-O is available in sizes 7.2, 14.4 and 23-kv; 400, 600 and 1200 amp continuous; 20,000, 40,000 and 61,000 amp momentary ratings; A.S.A. and N.E.M.A. standards. Write for Catalog No. 4-126 for full details from the Pacific Electric Switchgear Division, 5815 Third Street, San Francisco 24, Calif.

Finest Products Engineered

FEDERAL PACIFIC ELECTRIC

COMPANY

50 Paris Street, Newark 1, N. J.

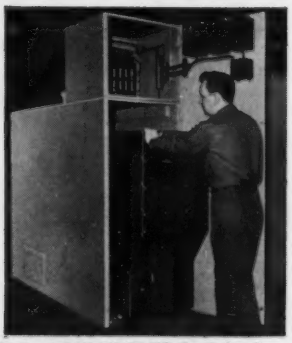
Division, 5815 Third St., San Francisco 24, California.

FPE

FEDERAL PACIFIC ELECTRIC

FEDERAL PACIFIC METAL-

FPE
FEDERAL PACIFIC
ELECTRIC

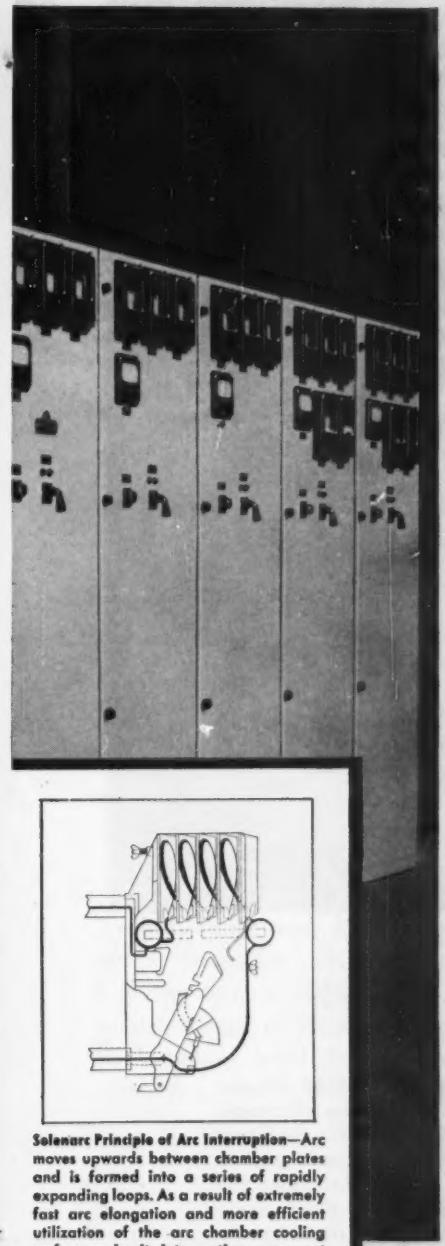


Horizontal DRAWOUT AIR Circuit Breaker—mounted on four-wheel truck can be easily moved "in" and "out" of its cell. Guide rails engage breaker wheels to insure proper contact alignment. Breakers of like rating are completely interchangeable.

Finest Products Engineered

FEDERAL PACIFIC

CLAD SWITCHGEAR



Solenarc Principle of Arc Interruption—Arc moves upwards between chamber plates and is formed into a series of rapidly expanding loops. As a result of extremely fast arc elongation and more efficient utilization of the arc chamber cooling surfaces—circuit interruption occurs at or near the first current zero.

Combines most advanced breaker design with proven advantages of Metal-Clad construction

Modern, functional in appearance, Federal Pacific Metal-Clad Switchgear design is being proved over and over again in a rapidly increasing number of trouble-free installations. Completely assembled, wired, and adjusted at the factory—Federal Pacific Switchgear is thoroughly tested before shipment.

MOST ADVANCED MAGNETIC AIR CIRCUIT BREAKER DESIGN—utilizing Solenarc principle of arc interruption for exceptionally fast, positive arc extinction. The reliability of these breakers has been field-tested in hundreds of installations and their interrupting ability proved by exhaustive laboratory tests.

FLEXIBILITY—removable breakers and associated equipment are installed in individual free-standing enclosures and bolted together to form complete switchgear assembly...permits easy field installation of additional units.

SHEET STEEL BARRIERS—divide section interiors into compartments isolating breakers, busses, instrument transformers, and cable terminations...permits complete accessibility...safeguards personnel from adjacent live circuits.

SHIPPED READY FOR INSTALLATION—overall assembly can be divided into shipping sections for convenient handling by purchaser.

NEW Scranton Plant—specially designed to provide the latest in switchgear manufacturing facilities—this spacious new plant consolidates Federal Pacific's assembled switchgear activities in one location.

FPE
FEDERAL PACIFIC ELECTRIC

ELECTRIC COMPANY

50 Paris Street, Newark 1, N. J.

One of the great threats to the mythical Jason and the Argonauts as they sought the Golden Fleece was passage of their ship between the forbidding rock of Scylla and the whirlpool of Charybdis. With steady hands Jason guided the *Argo* safely through the treacherous channel. To this day, Scylla and Charybdis remain a symbol of perilous hazard.

WHEN ENDURANCE COUNTS

Overcoming the perils of Scylla and Charybdis, Jason and the Argonauts demonstrated great endurance in the face of severe destructive elements. Another—and more modern—demonstration of great endurance is Kerite Cable. Under every manner of adverse condition, throughout the world, Kerite Cable stands steadfast against all the elements which would destroy its efficiency. Kerite Cables, in perfect operating condition after 40 or more years, in hazardous original installations, is the rule, rather than the exception. The world over, the Kerite name is recognized as a symbol of *durability*.

The value and service life of a product can be no greater than the integrity and craftsmanship of its maker.

Founded 1854

KERITE CABLE

THE KERITE COMPANY—30 Church St., New York 7, N. Y.
Offices also at 122 S. Michigan Ave., Chicago; 582 Market St., San Francisco;
3901 San Fernando Rd., Glendale 4, Calif.; 31 St. James Ave., Boston

Kennedy Likes to Get Things Done

"The most important thing I've learned is that it takes everyone working together to accomplish things." This observation by Donald S. Kennedy, new president of Edison Electric Institute, offers an insight into his working philosophy. It is an approach that he has used with consummate skill in administering the affairs of his own company, Oklahoma Gas & Electric. It is the approach he will use in his new position as head of EEI and chief spokesman for that organization.

Kennedy relies heavily on the advice and counsel of his associates at OG&E in conducting the utility's extensive operations. Each management member has his responsibility assigned and authority to carry it out. The results have been good employee relations throughout the company. Therefore, his organization is such that he will be able to devote the time required to his new duties as EEI president; and as the interview with Kennedy in this issue, page 104, indicates, he looks forward to the same sort of teamwork in EEI.

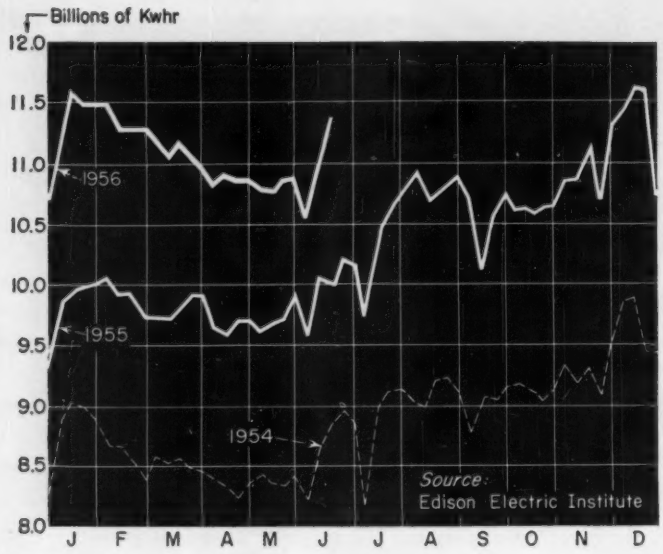
The emphasis on teamwork does not mean that Kennedy relinquishes his position of leadership and responsibility. On the contrary, Kennedy has risen from accountant to company president on the strength of his ability to get things done. His company leads the State of Oklahoma in promoting industrial development. OG&E is far along toward licking its technical manpower requirements. The company has taken an active role in fighting federal encroachment in its service area. Kennedy, in his quiet, modest manner, directs these activities as well as the many other planning and operating activities of his company.

Under the Kennedy administration, we may reasonably expect that EEI will get things done. He inherits from his predecessor, Harllee Branch, an ambitious program for coordinating and expanding the industry's nuclear power program. The "Housepower" program, also started during Branch's term, is just shifting into high gear. In light of Kennedy's interest and the industry's concern for obtaining technically trained manpower, it is likely that EEI will do more to whip up interest in utility careers. There are other areas, particularly internal communication, chosen for attention.

He has high praise for Edwin Vennard, the new managing director, and will depend heavily on the EEI staff to carry the expanded workload, especially in the nuclear power development and sales fields.

In his gentle manner, Kennedy will be keeping a close eye on most EEI activities and giving them a nudge when they lag. To Kennedy, "The greatest satisfaction in life is seeing things accomplished."

ELECTRICAL WEEK



OUTPUT

Week ended June 16
11,425,000,000 Kwhr
Up 14.4%

Atomic Energy Commission requirements—1,125,000,000 kwhr (Electrical World estimate). Excluding AEC, output increase was 12.5%

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
June 16	+14.4	+12.8	+10.5	+18.3	+19.8	+11.2	+22.1	+17.1	+13.6	+7.3
June 9	+9.1	+8.6	+5.0	+11.0	+9.9	+7.7	+14.3	+10.5	+15.5	+4.1
June 2	+11.1	+8.1	+6.4	+15.1	+10.2	+9.7	+17.2	+11.2	+12.2	+7.3

Seasonally Adjusted Index 220.1 Week Ago 212.9 Year Ago 192.4

Issue's Highlights . . . Electrical World uncovers letter from Paul Butler to Lyndon Johnson outlining power legislation needed to strengthen certain Democratic candidates in fall election . . . Niagara Mohawk Power cleans up Schoellkopf wreckage while New York Power Authority fights for Congressional approval of its Niagara power plans . . . Commonwealth Edison and AG&E plan to link their systems with a 330-kv line . . . Senator Anderson has field day in Senate with ECAP advertisement.

Voters in Ogdensburg, N. Y., turn down proposal to buy Niagara Mohawk Power's electrical distribution system and to use 35,000 kw reserved by St. Lawrence Power Authority for the city. The 61% vote against municipal ownership followed vigorous campaign by Niagara Mohawk . . . Citizens of Jackson, Miss., vote 60 to 1 in favor of 25-year franchise for Mississippi P&L.

Canadian Electrical Association elects Arthur C. Abbott president for 1956-57. He is vice president of distribution for Shawinigan Water & Power.

Senate confirms nomination of Arthur Kline, 47-year-old Wyoming judge, to five-year term on Federal Power Commission succeeding Claude L. Draper . . . Senate okays President Eisenhower's **reappointment of Dr Willard F. Libby** to five-year term as member of Atomic Energy Commission.

Edison Electric Institute plans 1959 convention for New Orleans, La., in April. June meetings are slated for Chicago in 1957 and Boston in 1958.

Elimination of preference clause in proposed Niagara power legislation is urged by Jacob K. Javits, attorney general for New York State. In telegram to House Public Works Committee, which is considering the bill, Javits says removal of preference clause "should end legislative deadlock."

NEWS OF THE INDUSTRY BRIEFLY TOLD

Washington Wire . . . House Commerce Committee approves bill designed to **permit General Public Utilities to continue to hold stock** in its Philippine subsidiary, Manila Electric. Securities and Exchange Commission had ordered GPU to divest itself of its Manila interests . . .

Federal Power Commission authorizes Idaho Power to issue $20 million in promissory notes to **finance construction of Brownlee Dam** in Hells Canyon reach of Snake River . . . Meanwhile, Senate Interior Committee approves bill to **authorize construction of a federal dam at Hells Canyon,** thereby clearing the measure for debate on Senate floor . . . But, House Interior Committee **postpones vote on a companion bill** until June 26 because of lack of quorum. Democrats on the committee complained that Republicans had stayed away deliberately; among the 14 members present—one short of the required quorum —there were just two Republicans . . .

Newly appointed **Interior Secretary Fred A. Seaton names** Elmer F. Bennett of Longmont, Colo., as his assistant to succeed Raymond Davis who resigned. Bennett has been legislative counsel and special assistant to Interior Department's solicitor since 1953 . . . **Federal Power Commission authorizes** Washington Water Power to buy the Washington electrical properties of Citizens Utilities Co for estimated $950,000.

Georgia PSC okays Georgia Power's application to sell $1 million of common stock to Southern Co. Proceeds from sale will be invested in Southern Electric Generating Co, a joint project of Georgia Power and Alabama Power to build a 1-million-kw plant on Coosa River in Alabama.

British Columbia Power Commission hikes electrical rates for first time in 11 years by eliminating a 10% prompt-payment discount.

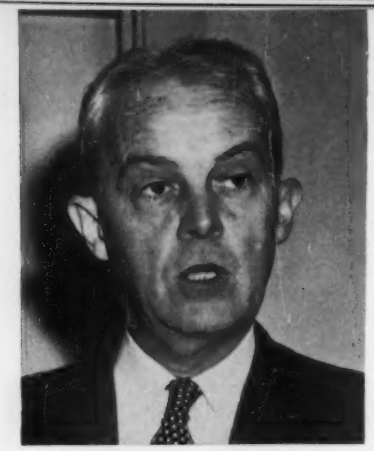
First Boston Corp group **wins $8-million Public Service of New Hampshire** 3⅞% first mtg bonds (A) due 1986 at 101.519%; reoffers at 102.239% to yield 3.75% . . . Kidder, Peabody & Co and White Weld & Co **place privately $5-million Central Louisiana Electric** 3⅞% first mtg bonds due 1986.

ABOUT PEOPLE IN THE INDUSTRY

SEC Chairman J. S. Armstrong proposes to **exclude private nuclear power projects from Public Utility Holding Co Act** by amendment to Rule U-7. "Fear of involvement with the Act may be a deterrent to participation by private industry in these important projects," he declares. Such companies "would not be electric utility companies under the Act" if primarily engaged in research and development, he says.

"Present prospect of getting any substantial quantity of industrial atomic power in this country by 1960 is very gloomy—and getting more gloomy every day," AEC Commissioner Thomas E. Murray tells Joint Congressional Atomic Energy Committee. Government should build "several large power reactors," and they should be placed at AEC plants "thus **eliminating the issue of public versus private power,"** he says.

More News About People page 254



Butler: A Strategist

Butler Letter Prods

Warns Sen Lyndon Johnson party victory in November depends on:

- **Federal development of Niagara project**
- **Halting Idaho Power Co at Hells Canyon**
- **Allowing TVA to use own funds for steam plants**
- **Boosting REA loan funds**

DEMOCRATIC NATIONAL COMMITTEE
1001 Connecticut Avenue, N. W.
Washington 6, D. C.

Paul M. Butler, Chairman — March 16, 1956

Honorable Lyndon B. Johnson
United States Senate
Washington, D. C.

Dear Lyndon:

I am fearful that our party and its nominees for President, Vice-President, the Senate and the House next fall may be in a very weak position in the area of natural resources unless some action is taken to bolster our legislative record in this session of Congress.

The Democratic record on Dixon-Yates and the Upper Colorado project is deserving of special commendation to our Democratic leadership and our Senators and Representatives. But if we are to be in a position to go to the people with a record on conservation of our natural resources that will gain votes in one key State and District after another, it is apparent that a few important measures should be considered in this session.

I strongly believe that the public interest will be served by the earliest possible consideration of the following four matters:

1. Niagara—This is S. 1823 which has been reported out of the Senate Public Works Committee. The passage of this bill is of tremendous importance in the re-election of Senator Lehman and in the Congressional elections in many districts in New York, Pennsylvania, and Ohio, where there are 40 REA cooperatives and 144 municipalities located within economical transmission distance of the Niagara project.

2. Hells Canyon—S. 1333 and H.R. 4719, 4730, 4739 and 4740 are identical bills covering this project. They are now pending before the Interior and Insular Affairs Committees in both Houses. Our campaign attack on the Administration give-away at Hells Canyon is meaningless if the Democratic Congress has not moved in the 84th Congress to stop it. This action is vital in the election of Democratic Senators and Representatives in the four Columbia Basin states (Oregon, Washington, Montana and Idaho) and will be an effective issue in other sections of the country. The Attorney General in Oregon is about to prosecute criminally Idaho Power Company the Administration's licensee, because it has commenced construction of one of its three small dams at Hells Canyon without having obtained an Oregon water permit. This issue is hot in Oregon and will be a vital factor in the re-election of Senator Morse and Representative Edith Green.

3. TVA Construction Funds—The House Appropriations Committee has approved the use of TVA's corporate funds, which have now accumulated far ahead of required amortization schedules, to aid steam generation units at John Sevier and Johnsonville plants and meet the impending power shortage in the Valley.

The Committee action reaffirms the opinion of TVA's General Counsel that corporate funds could legally be used for this purpose on existing units. If Congress carries through in both Houses, this would avoid needless delay from litigation which would probably be instituted to test the General Counsel's opinion. Such litigation is threatened. The minority report indicates that resort will be made to litigation to prevent such use of TVA funds.

Congressional action on this matter favorable to TVA will be of tremendous help this fall throughout the TVA area.

4. Loan Appropriations for REA—President Eisenhower's budget message this year called for $145.3 million for new loans under REA, with a contingency fund of another $25 million. The "contingency" has little meaning, since it cannot be used unless the full appropriation plus last year's carry-over has been earmarked.

Member cooperatives of the National Rural Electric Cooperative Association, in their estimate of needs for next year, show an aggregate requirement of $185 million in new loans as a conservative figure. Many of these cooperatives are located in important states and Congressional districts. I am therefore hopeful that the higher figure can be agreed upon and included in the appropriation bill.

You included in your 13 point program for this session both the Niagara and Hells Canyon bills.

Our party has made a magnificent record in the conservation of our natural resources in the public interest. It is a noteworthy achievement which we can bring before the American people. The enactment of the foregoing measures in this session would be hailed as the accomplishments of our Democratic Congress and would be vitally important in our retaining control of the Congress for the next two years.

I speak for the Democratic National Committee in addressing this communication to you. Its members and I will appreciate your consideration of these matters in the interest of our country and our party.

Sincerely,
Paul M. Butler

Democrats to Battle for Public Power

The Democratic National Committee is masterminding details of a major drive to make electric power a prime issue in the Presidential and Congressional elections this fall.

This is pointed up by a letter uncovered last week by Electrical World. Sent by Democratic National Chairman Paul Butler to Sen Lyndon B. Johnson (D-Tex.), the letter specifies legislation needed to help re-elect various Congressmen. Copies of the letter also went to Speaker Rayburn and a select group of Democratic Senators and Representatives.

Further Pressure

Further indication of political pressure on the power front was revealed by the recent formation of a 15-member Advisory Committee on Natural Resources (under former Interior Secretary Oscar Chapman). This group aims to push federal power policy as a campaign issue against the Eisenhower Administration.

This committee is well staffed with advocates of greater federal government participation in power. In addition to Chapman, there are these members whose previous records are well known: Michael W. Straus, former Reclamation Commissioner; Morris L. Cooke, former REA Administrator; Sen Richard L. Neuberger (D-Ore.); Rep Gracie Pfost (D-Ida.); S. R. Finley, general superintendent, Electric Power Board of Chattanooga, Tenn.; Walter Harrison, manager, Georgia Electric Membership Association, and member, National Rural Electric Cooperative Association.

In its initial announcement, this group said: "We believe in the resumption of the historic principles of comprehensive land, water, and energy development which were carried forward for the American people during the Roosevelt and Truman Administration." It added that the present Administration is "dominated and directed by the privately owned power companies of America and big business."

The Committee on many points takes the same line as the recently released Chudoff Committee report (EW, June 18, p 16).

Party Plank Proposal

Specifically, here is what the Committee intends to propose to the Democratic party for adoption as an official party plank:

1. "Resumption" of development of the river basin "as a unit." But the Committee contends such programs need not be similar to TVA.

2. Federal construction of steam power plants when and where these may be necessary to supplement federal hydro power generation, and federal construction of transmission lines, if they are needed.

3. Federal construction of nuclear power plants. Here the Committee says "We don't want to make the government the sole source of atomic power." But, they added, the nuclear power plants would provide "yardsticks" for nuclear power in general.

4. A halt to the Eisenhower "partnership" concept for local, private and public participation in development of power. The Democrats want "true partnership" — the Lehman-Buckley Niagara bills with preference for public power bodies. The Committee claims that these measures would permit the first establishment in the Niagara region of a public power "yardstick."

The Committee also will advocate federal construction of a dam at Hells Canyon, TVA revenue bond financing, a better break for co-ops on Southwest Power Administration rates, and other long-standing issues.

The current maneuvering taking place in the Congress on Hells Canyon, Niagara, and other federal power projects, appears to be related directly to Butler's March letter. Vote bargaining and whip cracking by leaders involves projects representing over $1 billion in taxpayers' funds.

"Political Chicanery"

One legislator close to these matters described the situation as "the most blatant piece of political chicanery I have seen in my 30 years on the hill."

Butler in his letter told Johnson "if we are to be in a position to go to the people with a record on conservation of our natural resources that will gain votes in one key State and District after another, it is apparent that a few important measures should be considered in this session."

His recommendations are carried in full on the facing page. With respect to his suggestions, here is what has happened and what is shaping up:

Niagara

Currently, the Lehman bill (S. 1823) has passed the Senate and is expected to be acted on shortly by the House Public Works subcommittee. House vote is expected to be close one way or another.

Hells Canyon

Legislation for federal construction of the Snake River project is the center of the most active maneuvering in Congress. The measure was stalled in the Senate Interior Committee because Sen Russell B. Long (D-La.) sided with the Republican minority. But Long has moved to another committee. The

(*Continued on page* 101)

CHAPMAN STRAUS COOKE FINLEY LEHMAN MORSE NEUBERGER

Politicians Grab the Spotlight While . . .

Niagara Mohawk Girds for Action

• Wrecked by a rock slide June 7, the Niagara Mohawk Schoellkopf plant and grounds are now being studied by engineers and geologists. Their report will guide President Machold in deciding what must be done.

• Meanwhile, the N.Y. Power Authority has asked for Congressional approval of its Niagara power plans

Machold: It's His Move

Moses: Eyeing Niagara

While politicians were busily turning out statements and press releases aimed at capturing Niagara Falls for "public enterprise," engineers and geologists at Niagara Mohawk Power Corp were working hard to clear the picture for future action.

As Electrical World went to press last week, this was the current situation:

• A dozen engineers and four geologists were making repairs necessary to permit the company to evaluate the disaster in terms of what should be done in the future.

• A coffer dam had been built and water shut off in the canal leading to the plant.

• Butterfly valves had been closed and stoplogs lowered to shut off water in the tunnel leading to sections 3 B and C.

• This whole dewatering process was completed last Tuesday (6/12) enabling engineers at last to enter the flooded Section A, which was not swept away by the rock slide.

• Engineers were preparing a report for management. The report was expected "momentarily."

• Niagara Mohawk was taking 225,000 kw of 25-cycle power from the Hydro-Electric Power Commission of Ontario. (The rock slide occurred at 5:25 p.m. on June 7, and on the morning of June 8 Niagara Mohawk received assurance from the Canadian commission that a block of 225,000 kw of 25-cycle power would be available to Niagara Mohawk for at least three years.)

• Niagara Mohawk Pres Earle Machold and Robert Moses, chairman of the Power Authority of the State of New York, had met at Moses' invitation to discuss the general problems involved. But no decision of any kind was reached.

• Machold had sent a letter to stockholders outlining what had happened, and stating that "it cannot presently be determined how much of the loss may be recovered from insurance. There is evidence that fire occurred, a hazard which is insured, but our coverage, identical with that generally carried in the utility industry, does not include protection against earthquakes or landslides."

• The letter stated: "We expect that the future earnings of the company will not be materially affected." He pointed out that the output of the Schoellkopf plant has now been replaced by higher cost power sources, but that rates have been adjusted. "We will be fully capable of continuing service through our own generating facilities and existing interchange and other agreements for the period of time within which it will be possible for Niagara Mohawk to replace the lost generating capacity," he continued.

Niagara Mohawk, meanwhile, had called in three eminent geologists, and the State of New York sent one of its own. The team was seeking to discover, if possible, the cause of the disaster. It also was searching for erosion that might spawn trouble elsewhere. The condition of the high bank —particularly behind Station A—was being studied closely for its potential hazard.

Moses Wires Harriman

Meanwhile, politicians jumped into action. Shortly after the Schoellkopf disaster, the trustees of the New York Power Authority held a special meeting. Subsequently Robert Moses sent a telegram to New York's Gov Averell Harriman. The message outlined the Authority's official position:

"We believe," it said, "that the only sound method of replacing the power is by additional power units at the proposed Authority plant at Lewiston, where there will be 100 ft of additional head. While Ontario Hydro can temporarily supply the power lost to Niagara Mohawk, there is no permanent solution except by Federal Power Commission license to the State Power Authority to proceed to construct the project. Therefore, prompt action by Congress is the only possible hope of early restoration of power at Niagara."

The telegram stated that the Authority can work under the Lehman bill, if it passes, despite possible conflict

with the laws of New York State.

"We think, however, that an amendment to the preference clause adding the words, 'within economic transmission distance' would help materially," the telegram continued.

(A spokesman for the Authority later said that "economic transmission distance" would be determined by engineers. But who the engineers would be, or whom they would represent still remains clouded by the preliminary nature of this proposal. However, it was felt that a great part of the Niagara power would be fed to Niagara Mohawk if the Authority receives the Congressional mandate it seeks.)

Preference Clause Compromise

The Authority's trustees also pointed out that "if it is necessary to omit the preference clause in order to pass the bill, this should be done." Then the Federal Power Commission should be directed by legislation to consider preferences at a public hearing, the trustees added.

"We profoundly believe that the important thing is to get a bill mandating the Authority to do this work without delay and to avoid a stalemate which would throw the whole subject back into politics and confusion and create an impasse . . ."

Gov Harriman immediately telegraphed President Eisenhower urging him to recommend that Congress enact legislation directing the FPC to issue a license to the Authority to develop the power. Sen Herbert H. Lehman (D-N.Y.), also telegraphed the President requesting support of his bill "without controversial changes or amendments" which might delay legislation.

STATEMENT BY FERRANTI, LTD.

An article published in the March 5 issue of the Electrical World entitled "Foreign Transformers Fail," through the use of the word "fail", implied that transformers furnished by Ferranti, Ltd. for Garrison Dam were in some way defective in workmanship, material or design with particular reference to the tap changing unit.

There was no defect in the transformers of any of them. The transformers had been delivered and installed in first class operating condition and had been tested, accepted and paid for before the dedication ceremonies.

No trouble was caused *by* the tap changing unit of any transformer. Damage was done *to* the tap changing unit of one transformer by exciting the transformer without setting the tap changer.

Election Politics: Butler Calls for Power Legislation

(*Continued from page* 99)

Interior Committee had scheduled a vote June 14 on the measure, then cancelled it, reportedly to wait for Long's replacement and to give Democrats credit for action to be taken. Some sources, however, are claiming there has been further defection among Democrats, largely because of resentment at the pressures being applied to pass the measure.

On the House side, there have been several reports, and denials, of a "deal." Rep J. Edgar Chenoweth (R-Col.) himself told a news service that he had made an agreement with Rep Sam Rayburn (D-Tex.) whereby, for his favorable vote on the Hells Canyon measure, Rayburn would have the Fryingpan-Arkansas project released by the Rules Committee. Passage of the measure is considered necessary for Chenoweth's re-election. Rayburn then denied the deal, but Chenoweth came right back and repeated that he made such an agreement with Rayburn.

Rep Hamer H. Budge (R-Ida.), commenting on the Hells Canyon situation, said Butler is being "mighty reckless" with public funds in an effort to get some Democratic members of Congress re-elected.

TVA Construction Funds

The use of TVA's corporate funds to build additional steam units at John Sevier and Johnsonville plants has been approved by Congress. TVA is going ahead with the additions. When the question of such use of TVA funds came up before the Senate appropriations subcommittee, Sen Karl Mundt (R-S.D.) blasted TVA for having "been able to intimidate the House" and of trying to "ride roughshod over the Senate." His protests were to no avail in the light of subsequent Congressional approval of TVA's use of its funds for additions.

Loan Appropriations for REA

Butler stated: "Member cooperatives of the National Rural Electric Cooperative Association, in their estimate of needs for next year, show an aggregate requirement of $185 million in new loans as a conservative figure. Many of these cooperatives are located in important states and Congressional districts. I am therefore hopeful that the higher figure (Eisenhower had asked for $145.3 million appropriation plus $25 million "contingency") can be agreed upon and included in the appropriation bill."

REA obtained $214 million, including $25 million "contingency."

The final piece in the foregoing picture comes from an editorial in the June Rural Electrification Magazine, NRECA's official publication. It notes that Colorado and Nebraska Senators voted against Lehman Niagara bill.

It contrasts this with "the urgent desire of the Coloradans for action on the Fryingpan-Arkansas river basin development, and support this year by the Nebraska delegation for the transmission line from Fort Randall Dam to deliver federal power into their state." The editorial quotes Rep Michael J. Kirwan (D-Ohio) as saying "I don't believe Nebraska should get a federal appropriation for this transmission line when it has been in opposition to appropriations for public power in its sister states."

Political Fireworks Show . . .

How an ECAP Ad Hit the Senate

Sens Clinton P. Anderson (D-N.M.), and Albert Gore (D-Tenn.) made a field day of attacking on the Senate floor the electric companies' advertisement on atomic energy.

The ad appeared in 29 metropolitan newspapers throughout the country. Sen Gore has had inserted in the Congressional Record the complete ad and a list of all the newspapers in which it appeared. He noted that on the basis of the lists of newspapers, the electric companies had spent $100,000 "to mislead and misinform the American people."

Anderson, chairman of the Joint Atomic Energy Committee, echoed Gore's opinion of the ad, saying, "I think it is a tragic thing that an attempt is made to picture this activity in a way in which it does not deserve to be portrayed."

Anderson said it would be a good idea to summon the presidents of the companies sponsoring the ad to "tell us where these 90 reactors are . . . we cannot find where 90 power reactors are being planned; and Chicago Pile No. 1 could scarcely be called a power reactor, it seems to me."

[*Ad identified these 90 reactors as "nuclear reactors built or planned . . . all types and for all purposes."—Editor.*]

The Joint Committee chairman said he had asked for a list of sponsoring companies to the ad "because this is the sort of thing that gets the private electric industry into trouble . . . we have been trying in every way we can to help the electric industry get off the ground. But this advertisement is the sort of thing that sinks the industry back to earth again."

Both the senators, in a sort of "tossing-the-ball-back-and-forth-session" on the floor, criticized the advertisement for what they consider these major inaccuracies:

• Attempting to convey that all the reactors underway or planned in this country are power reactors.

[*Ad said "all types and for all purposes."—Editor.*]

• Attempting to imply that the private industry has done most of the work on advancing the development of atomic power.

[*Ad stated "Foremost in this experimentation is the basic and comprehensive reactor research program led and carried on by the Atomic Energy Commission . . . From this basic research—some of which is also being done by America's independent electric companies—the next step is big, full-size commercial atomic-electric plants."—Editor.*]

• Giving an incorrect picture of the Soviet status of atomic power development.

[*The only mention of Russia's nuclear program in the advertisement was in the tabulation which stated they had 6 reactors completed as of 1956 and 11 being built or planned.—Editor.*]

Anderson said, for instance, the U. S. lead in atomic development had been brought about by the "government's sponsoring of the program —not by the private utility companies, as the advertisement would lead one to believe."

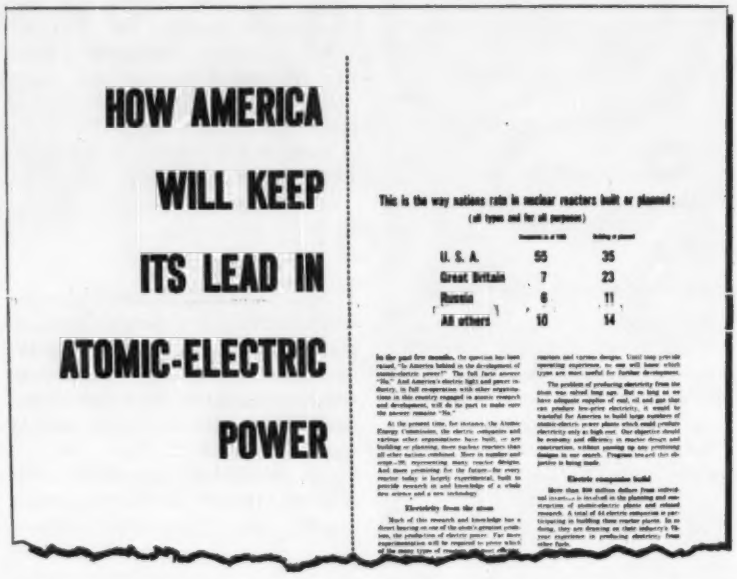
The New Mexico senator said: "I think it is too bad if we try to pick up all the reactors which have been constructed by great public-spirited individuals or organizations and say, 'this is the magnificent work of the private utility industry of America.'

"To try to make up a claptrap advertisement in a newspaper, with the idea of persuading the American people that private industry has carried the load all the way and is now prepared to carry it in unprecedented proportions, is ridiculous."

With regard to the picture on Soviet atomic progress, Anderson had this to say:

"I think we should ask American industry to write another advertisement, explaining the terrific advance of the Russians, in view of all the numbers against them. We have 90 (reactors) on our list, and there are only seventeen on theirs (ECAP list)."

Anderson expressed the hope that "We shall have a hearing on this subject before the Congress adjourns, because I want the private utility people to bring me up to date." He said the AEC was supposed to keep the Joint Committee up to date, but if the AEC falls down, "I assume private industry can pick up the ball and give it to us."



HOW AMERICA WILL KEEP ITS LEAD IN ATOMIC-ELECTRIC POWER

This is the way nations rate in nuclear reactors built or planned:
(all types and for all purposes)

U. S. A.	55	35
Great Britain	7	23
Russia	6	11
All others	10	14

Changes in Capacity Reported to FPC

PLANT ADDITIONS DURING APRIL

State	Utility	Plant	Fuel	Capacity
Mass.	Holyoke Gas & Electric Department	Holyoke	S	10,000
N. Y.	Niagara Mohawk Power Co	Rainbow	H	22,500
Ill.	Sullivan, City of	Sullivan	IC	1,500
Mich.	Constantine Electric Plant	Constantine	IC	700
Minn.	Village of Grand Marais	Grand Marais	IC	675
Iowa	Orange City Municipal Light Plant	Orange City	IC	1,400
Kan.	Chanute, City of	Chanute	IC	1,700
Kan.	Southwestern Public Service Co	Elkhart	IC	295
Fla.	Lakeland Light & Water Department	Lake Parker	S	25,000
Tex.	Gulf States Utilities Co	Nieches	S	100,000
Ore.	U. S. Army Engineers	McNary	H	70,000

RETIREMENTS

Mich.	Hillman Light & Power Co	Hillman	IC	125
Wis.	Milwaukee, City of	Incinerator	S	600
Minn.	Village of Grand Marais	Grand Marais	IC	97
Mo.	Missouri Edison Co	Elsberry	IC	92
Mo.	Missouri Edison Co	Louisiana	IC	160
Mo.	Missouri Edison Co	Troy	IC	806
N. D.	Otter Tail Power Co	Westhope	IC	120
Neb.	Wayne Light Department	Wayne	IC	500
Ark.	Arkansas Power & Light Co	Elaine	IC	396
Ark.	Arkansas Power & Light Co	Marshall	IC	400

U. S.	Hydro	Steam	IC	Total
Added	92,500	135,000	6,270	233,770
Retired	.....	600	2,696	3,296
Adjustments Plus	.....	7,000	2,472	9,472
Adjustments Minus	.....	17,091	3,100	20,191
Net Change	92,500	124,309	2,946	219,755

H—Hydro, IC—Internal Combustion, S—Steam
United States Capacity as of May 1—Hydro, 25,402,761 kw; Steam, 89,011,073 kw; IC, 2,363,462 kw; Total, 116, 777, 296 kw.

Reactor Safeguards Called Adequate

Knotty health and safety problems facing the nuclear power industry have been brought into sharper focus in the report issued by the National Academy of Sciences—National Research Council. The report sums up a year's study by over 100 eminent scientists looking into biological effects of atomic radiation. For power reactor builders it had these findings:

- Present safeguards are more than adequate to protect atomic plant workers against dangerous exposure to radiation. If safety rules are observed, none need fear impaired health, or genetic damage to his offspring.
- The explosion-proof power reactor is yet to be built. Until advances in reactor technology substantially reduce potential hazards," the report urges that reactors built in populous regions be "enclosed in sealed buildings, strong enough to withstand pressures" of expanding vapors. More study of the effects of runaway power surges that release these vapors and means to control them remains a pressing need.
- Disposal of radioactive wastes—present tank storage is only a stop-gap expedient—will rear up as a major headache, and soon. By 1965, the report estimates, U. S. reactors will produce 20 pounds of fission products daily. The figure will reach 200 million a day by 1980, and hit 2.4 billion a day by 2,000, mainly in atom-fueled electric utility systems.

Commonwealth, AG&E Plan 330-Kv Interconnection

Plans to strengthen the interconnections of Commonwealth Edison Co with neighboring utility systems were revealed last week in a jointly announced decision of American Gas & Electric Co and Commonwealth Edison.

The companies plan to connect their systems with a 330-kv transmission line. Principle use of line will be for interchange of large blocks of emergency power. Estimated cost of the line and related facilities is $25-million.

Initially, line capacity will be 300 Mw with ultimate expansion to as much as 1,000 Mw. The existing connection between the two systems has a very limited capacity for the transfer of emergency—normally about 50 Mw.

The transmission line will be 90 miles long. It will connect a new terminal at New Carlisle, Ind., to be built by Indiana & Michigan Electric Co, a subsidiary of AG&E, and a new Edison distribution center that will be built at Goodings Grove near Orland Park, Ill.

The line will consist of six conductors, each 1¾ in. in diameter. Approximately 500 steel towers, most of them 145 ft high, will be needed to carry the conductors.

Sewerless Toilet Seen as New Round-Clock Load

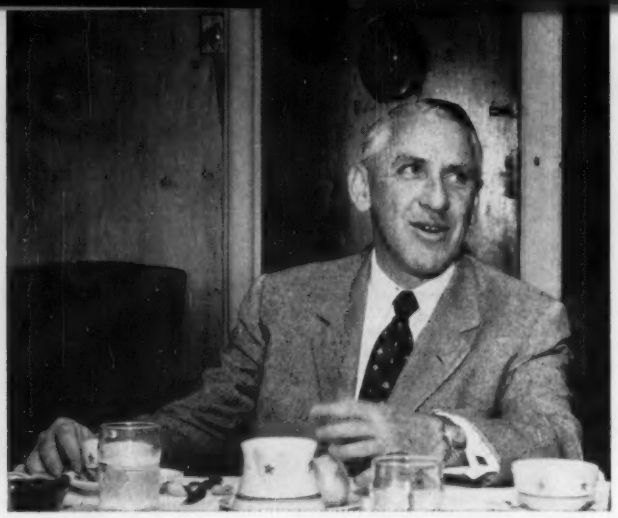
Now a sewerless toilet—and one that could add as much as 80 kwhr of round-the-clock load each month to a utility system's line.

The toilet, as reported in the June issue of House & Home magazine, uses three electric motors: A grinder, a water pump, and a 75-w air compressor which operates constantly.

Here's how it works: Waste from toilet is flushed through the grinder into a treatment tank where the air compressor forces air into it through porous stone. The bubbling air dissolves oxygen in the liquid to feed bacteria which convert sewage solids into harmless, odorless gases. Processed odorless liquids are used over and over for flushing the toilet. Excess liquids flow through a drain pipe into a small underground tile field. Gases are drawn off through a vent. System also will handle sewage from kitchen, laundry, and other bathroom fixtures —everything but garbage.

Price of the toilet may be about $600 and the article says dealers will install it at prices competitive with septic tank systems. Enthusiastic builders find it makes home construction possible on heretofore unusable land. It has been found to save water, too—up to one half of an average home's consumption.

"In the atomic power area, I'm sure EEI can provide leadership . . ."



"We will continue to emphasize sales through our established committees . . ."

What's Ahead for EEI?

Following is an interview with Donald S. Kennedy, new president of Edison Electric Institute, also president of Oklahoma Gas & Electric Co:

Question: Mr. Kennedy, what do you see as the major EEI tasks in the year ahead?

Kennedy: Of course the Board of Directors have pretty well spelled that out. First, I think you are going to see an aggressive program to accelerate industry development in the field of nuclear energy. We are going to move ahead on a sound technical basis as fast and effectively as we possibly can. In the atomic power area I'm sure that EEI can provide coordination and leadership which the industry needs to get the atomic power job done on a sound basis. Second, we will continue to emphasize sales through our established committees and by individual company efforts. The "Live Better . . . Electrically" and the "Housepower" activities have broad industry support. We must take full advantage of them as a part of an aggressive selling campaign. And, third, we have to give more attention to internal communications in our industry. Communication breakdowns within a company and within an industry are the bane of our modern business society. Perhaps EEI can help develop suggestions and techniques that will improve the exchange of information.

Q: Don, you mentioned atomic energy research. What about research in other fields?

Kennedy: I'm sure you will see continued utility research in distribution and transmission. It sometimes seems that more attention has been focused on generation. Now, with increasing demands for service reliability, we have to improve constantly our transmission and distribution systems.

Q: The matter of industry public relations has been a favorite subject at every EEI convention. It is one of the industry's major concerns. Why doesn't EEI have a public relations committee?

Kennedy: That responsibility has been with other organizations. There is talk of re-aligning some of those activities. I think that until that is done we might consider use of an EEI committee in that field.

Q: How do you think the industry stands with the public?

Kennedy: I know we have made magnificent progress over the years. Perhaps we are doing better on a local basis than we are on a national basis. We must, of course, be prepared to meet opposition and that should move us to make the most effective use of the talent we have in the industry.

Q: Is the industry making any headway in its efforts to combat federal encroachment?

Kennedy: Well, it looks like government power generation will decrease in the overall picture. By that I mean that the percentage of federal generation will become less as a part of the total generating capacity in the country. From that standpoint federal expansion seems to be contained at the moment. That doesn't take into account what may happen if Congress passes the Gore Bill or some other legislation that would open the way to federal expansion of nuclear power generation.

Q: How can the industry put up a more effective fight against federal power?

Kennedy: The issues boil down to just these: tax equality and preference. If the industry received equal treatment with that given the public power groups, our problems would take care of themselves. I think what we have to do is to get our story on these two issues across to the public and to Congress. On that score, it is my opinion that the people are ahead of their representatives in Washington in understanding our viewpoint. We must convince Congress that their constituents are basically in favor of fair and equal treatment for the electric companies.

"It looks like government power will decrease in the overall picture . . ."

". . . the paper said most any afternoon I could be seen on a golf course . . ."

—Kennedy Gives the Answers

Too many Senators vote for expansion of federal power in the mistaken belief that they are building support for their next election. I don't think they are truly representing the views of their constituents. But that's what has to be straightened out.

Q: Do you think individual companies should designate one of their top management men to deal mainly with legislative problems?

Kennedy: Certainly that is what the oil industry did when they went to bat on the gas bill. In most cases the company presidents devoted a big share of their time to this single legislative fight. I think we might consider some means of devoting more attention to these federal issues if we are to get our story across.

Q: I wonder if EEI statistics might be more useful if they were presented in a broader perspective? Would a staff economist help?

Kennedy: I believe that the answer to that is that Ed Vennard (new managing director of EEI) is going to give us a big hand in that respect. As a top notch executive he is well trained to marshall facts and figures and present them in the most effective manner. Also I think Ed will have a number of proposals for improving EEI's effectiveness.

Q: Will the EEI staff be expanded?

Kennedy: Certainly we want to keep it at full strength. Right now that means filling some vacancies. Whether it will be expanded depends on the extent to which we expand activities.

Q: What's your answer to the industry's future manpower needs in face of the engineering shortage?

Kennedy: The first thing to do is to make the most effective use of the technical manpower we now have. A survey in our company showed that we had engineers doing drafting and other jobs which didn't measure up to their abilities. By taking full advantage of the talent we have, by hiring less skilled men to take on some of the duties, we find we are not as pressed as we had thought.

Q: How can we provide more engineers for future industry needs?

Kennedy: That calls for a really long-range program. It means providing the proper subjects in high schools. In Oklahoma City we have organized the "Frontiers of Science" foundation and raised more than $800,000 to enable high school teachers to receive advanced training in mathematics and science. In many schools these subjects are not available. The same is true of science subjects.

Last summer we sent a number of high school students to colleges to enable them to take courses in these subjects. That certainly gives them some encouragement to go ahead into engineering and other technical courses.

Q: Is this the kind of activity that EEI might sponsor to build a supply of technically trained manpower for the industry?

Kennedy: I would think that the Board might want to consider some means of encouraging young people to prepare themselves for a career in the utility industry. Just what types of activities would be appropriate for EEI would have to be determined by the Board of Directors.

Q: Don, besides golf, what is your professional background?

Kennedy: Your mention of golf is a sort of sore subject with me. When I was made president of my company, the paper mentioned that most any afternoon I could be seen on the golf course. It so happened that a few days before I actually was playing golf and ran into about four line crews which were putting up a new line in the area. The linemen had so much fun guying me about my game that I finally offered to let them take my place on the course. They were having more fun than I was.

EEI Reflects New Cohesive Spirit

At 24th Convention industry asserts atomic leadership, shows confident aggressive mood backed by public support

Electric companies will continue to take major responsibility for the development of all promising atomic reactors. This was the notice served on public power advocates in and out of Congress early this month as the board of directors of Edison Electric Institute met at Atlantic City.

Acting on the recommendation of EEI's Atomic Power Committee the board took these steps:

- Set up a technical appraisal task force of independent atomic scientists and engineers to recommend reactor types that merit development.
- Called a conference of electric company presidents to study the entire atomic program of the U. S. and the role of power companies in it.
- Endorsed formation of a national evaluation group to provide a continuing means of scientific, engineering, and economic evaluation of power reactors.

Taken in relation to the Gore Bill's proposal to put the federal government in the atomic power business, EEI's action is a clear indication that electric companies are determined to carry out in atomic power the same kind of technically-guided development that won the U. S. undisputed leadership in energy production.

Working separately, the management group of the Electric Companies Advertising Program also took immediate steps to carry to the public, through newspaper advertisements, the industry's determination to keep its hard-won lead in atomic electric power.

These developments outweighed in importance and significance other parts of the formal program of EEI's 24th convention.

In spirit they reflect:

- Aggressive, cohesive, action of an industry determined to move forward guided by the best brains America has to offer to accelerate and expand the development of atomic power.
- Conviction that such action—when known and understood by customers, employees, investors, and the American public will win effective public support.

But in the official program there were signs that in 1956 electric companies had acquired a new confidence in themselves, a new awareness of public support, and an understanding of the tasks ahead and the tools they will require.

Highlights of convention speakers' comment are evaluated in the following paragraphs.

Public Relations

The spirit of conviction, courage, and cohesiveness that has marked utility action in 1956 is being reflected in growing public esteem and self confidence.

Power companies have literally come off the canvas this year to slug it out with opposition. They have found the oppositioin much less a public favorite than they thought.

Public opinion experts concede that electric companies have come a long way in gaining public support. Yesterday the industry's job was learning how to win majority support. Today it has become one of making hard-won support effective.

Realization that public consent is vital to the business life of the industry has taught power companies that they must keep the story of their pioneering in atomic energy before the public.

Already the atomic pioneers have found that public consent can't be won on the basis of generalities, ideology, and political philosophy. It must be won on a direct, local, company-name basis to be effective.

And now as the U. S. approaches the Presidential election, both business and the public are hopeful and confident—prepared for a reexamination of governmental practices, a reappraisal of political and economic policies, and a reassessment of social accountability.

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Finance, Rates and Regulation

Failure to balance the federal budget in 22 out of the last 25 years adds conviction that legislation should compel its balancing year in and year out. Only in war and during grave national emergency, declared by Congress, would deficits be allowed.

Congress needs a debt-preventing tool that will limit federal expenditures to revenues and end deficit financing and incurrence of debt, advocates declare.

A proposal has been made that constitutional amendment limit expenditures to sums the taxpayers are able and willing to contribute to their government.

Congressional spokesmen, critical of spending by offi-

cials in the executive branch, feel there is nothing more important than for Congress to regain control of the budget.

Unsound business practices also mark the fixing of rates for federal power . . . in that the charge for use of government money fails to match or exceed the cost to the lender. Inordinantly long amortization periods—approaching 100 years—are also drawing criticism, and exemption of federal property from taxation is becoming intolerable.

Action by Congress may be necessary to insure that taxes, costs, and charges consistent with sound business principles are included in the rates for federal power and are borne in fair proportion by consumers.

However, financiers looking at the power companies' record since the war saw plant and equipment account up 112%, utilization high, output rising 132%. They were encouraged by the fact that both gross and net rose by like percentages. But with an eye to tremendous capital expenditures required by growth needs, they counseled a close watch on cost inflation which can boost capital needs beyond expectations.

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Labor and Management Relations

On the labor front, future stability of industry hinges among other things on ability to improve communications between management as a group and labor leaders as a group. No insurmountable obstacles are in the way. Certainly differences in viewpoint are no bar to discussion.

What's needed in the view of management is a practical means—an auspices—under which management and labor leadership can get together under informal circumstances to talk over matters on which an exchange of thinking would help both sides.

Sponsorship of such a forum—free of such trappings as agendas, memos of understanding, and minutes—should be a joint industry-labor affair drawing representation from all types and sizes of companies and unions. Representatives should rotate and attendance at each session be kept down to stimulate discussion.

This will to communicate, coupled with a growing tendency of both management and labor to look for the substance behind slogans, was mutually applauded.

Labor's contribution, with an eye to the strike sensitivity of power companies and its own abhorrence of compulsory arbitration was a "Council on Industrial Relations" patterned after that developed by the IBEW and employers in the electrical contracting industry. Such a council would have equal representation and would meet quarterly to hear and decide disputes where good faith bargaining at the local level had failed.

Such a plan, with modifications, would in the view of labor's spokesman benefit the electric utility industry. Free enterprise, as labor sees it, is not a one way street. It requires collective bargaining as a basic ingredient if it is to operate fairly for both management and labor.

Labor, Industry Need Joint Program..**Mark W. Cresap**....**page 120**
Public Power Is Threat to Unions.....**G. M. Freeman** .....**page 122**

Engineering Progress and Technical Manpower

With the rate of progress in the production and use of electric power outstripping advances in service reliability, utility leaders point to reliability as today's major goal.

Not generation but transmission and distribution—where weather is the greatest enemy—are the areas they see as most frequently in trouble. Victory has not yet been won in the battle with wind, ice, and storms.

In distribution particularly the answer lies not in resort to expensive underground systems, but in improving the overhead system itself through bold major redesign. It will require new structural and electrical designs to achieve this goal.

A major ingredient of this need and in fact all future technical progress is technical manpower. Today, America needs twice as many scientists and engineers as the 45,000 it produces annually.

This problem reflects industry's lack of alertness and failure to interest, guide, and motivate qualified students.

Solution lies in shoring up sagging emphasis on math and science in the high school to give them and their teachers status.

Specific points of application in concentrating community efforts are:

- Improving student guidance and career counseling.
- Helping teachers prepare themselves for better teaching and giving them adequate equipment and aids.
- Elevating the status of math and science courses and of the teachers of these subjects.

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Renewed Confidence Spurs Gains

HARLLEE BRANCH, JR,
President,
Edison Electric Institute,
Georgia Power Co

"I am optimistic because our industry has continued its ceaseless search for ways to serve the . . . American public . . . cheaper and more efficiently . . . Only question is whether we have stamina to turn apparent defeat into victory."

Great events have marched across the pages of our industry's history since last June. I believe it will be recorded that our industry achieved not only a new measure of public esteem but of self confidence. We have made substantial progress toward achieving that clarity of objective and that unity of purpose so essential to an effective defense of the rights of the 80% of power users who depend upon our electric service.

It will strike you as strange, perhaps, that I should speak of increased self-confidence and enhanced public support in the face of recent setbacks in Washington. These were setbacks that pose real threats for our customers and investors and the public generally. But I have the feeling that they are but lingering shadows in a gradually brightening outlook.

A New Spirit Is Moving Our Industry

In the first place, I am optimistic because a new spirit is beginning to move our industry. It is a spirit of conviction, and of courage, and of cohesiveness too often lacking in earlier years. Utility executives and employees have shown an increasing willingness to talk back to self-serving politicians and to demand fair play for customers and investors.

This new spirit was manifested in the challenge you hurled at the Chudoff Committee—a challenge which resulted in complete loss of public confidence for its politically inspired findings. It was manifested in your vigorous defense of the Dixon-Yates contract which served to alert the public as never before to the heavy cost of government power to the taxpayers and the rank discrimination for a favored group. It was manifested in your enthusiastic acceptance of invitations to testify:

Bad Bills Fought; Good Ones Backed

(a) In opposition to revenue-bond financing for TVA based upon evasion of Congressional controls and offering a "windfall" of past federal appropriations of not less than $1.7 billion;

(b) In support of Revenue Act revisions aimed at relieving the inequalities which have made "second-class" citizens of electric company customers and investors;

(c) In opposition to the Gore bill for a "crash" program of atomic power plants to be built by the government;

(d) In support of the Potter-Pastore bill aimed at eliminating regulatory barriers which inhibit joint construction of generating plants by utility companies to assure a power supply for their customers at minimum cost and with maximum efficiency.

Top Leaders Were Willing to Testify

Never before have so many top leaders of our industry been so ready to join in telling the industry's story to Congressional committees. This attitude, plus the poise and logic of those who testified, won new respect for our industry. It provided the public with information of the sort necessary to sound democratic judgments. Best of all, it gave the professional advocates of governmentalized electric power their first real challenge in many years. It was a demonstration of industry-wide responsibility and forthrightness which will assure reversal of a 25-year trend toward socialization of our industry.

I am optimistic because of the overwhelming voter preference for the independent electric companies rather than subsidized power organizations as expressed in numerous elections during the past year. Only one new municipal system has been established. Nine have been discontinued and eight have been sold to electric companies. This brings the total of municipally owned systems to its lowest level since 1939.

Only in Washington Have We Lost

Our industry's only serious setbacks in recent months have been at the hands of Washington legislators and officials who have been pressured into supporting socialistic power measures by self-seeking minority groups. The recent Niagara vote is an eloquent example. There the Senate, by a narrow majority of only nine votes, directed State development of a power project which residents of the affected area had asked to be developed by free enterprise electric companies.

I am optimistic because I know that the sentiments

of an informed and altered people ultimately will prevail. Our industry has begun to tell the people exactly what government power involves—in terms of their own pocketbooks and their own economic opportunities—and in plain and unequivocal language that the man in the street, on the farm, and in the factory can understand.

Support Has Come from Unexpected Quarters

As a result of plain talk—branding "preference" and tax subsidies the un-American devices they really are—we have begun to attract support from some unexpected quarters. Adlai Stevenson, in the course of his recent Oregon campaign, declared himself in favor of the basic "partnership" idea of federal and private collaboration in resource development. The New York Times, long an advocate of TVA, editorially declared its opposition to the so-called "preference" clause because it inequitably limits the benefits of low-priced electricity to the relatively few customers served by publicly owned utility systems. Former Gov Thomas E. Dewey has been reported as opposed to the grant of special privileges in Niagara power to subsidized power organization.

I am optimistic because of the apparently diminishing interest in the so-called "public-versus-private" power issue. Today it is rarely listed as an issue of any importance at all. On television from Florida two top Democratic presidential aspirants completely omitted this from their list of '56 campaign issues. I do not mean to suggest that government power will not be mentioned in the coming campaigns. I mean that a better informed public in most sections of the county will be little moved by it. And that, I think, is a vastly significant fact for the future.

Homefolks Like the Job We're Doing

I am optimistic because of the impressive number of citations received during the past year by electric companies and their executives from their own homefolks as well as State and national bodies interested in area and regional development, soil and water conservation, and the like.

I am optimistic because our member companies during the past year have shown that they can do the really big jobs for a power-hungry America. One of the greatest engineering accomplishments of all times was the recent completion of the Clifty Creek plant by the Ohio Valley Electric Corp—well ahead of schedule and considerably under original cost estimates. It and its companion plant, Kyger Creek, have a capacity of 2,365,000 kw and were constructed at a cost of $385 million in only three years.

Our Companies Are Doing Big Things

Alabama Power Co has applied to the Federal Power Commission for a license to complete one of the most comprehensive development programs in American history. The company plans to develop fully the great Coosa River by construction of four additional hydroelectric plants and enlargement of an existing plant at a cost in excess of $100 million. The company also proposes to build two new hydroelectric projects on Alabama's famous Warrior River.

Idaho Power Co is proceeding rapidly with its development of a gigantic three-dam project on the Snake River despite continued political sniping by advocates of socialized power. A group of Northwestern companies proposes further development of the Snake below Hells Canyon.

On May 1 the American G&E System announced the proposed construction of two 450,000-kw steam-electric generating units, the largest ever undertaken. The units will embody the most advanced engineering concepts and achieve a higher efficiency than has ever been reached before.

Of especial significance are plans for developing atomic power plants. Within the past month the Atomic Energy Commission has authorized Consolidated Edison Co to proceed with a 236,000-kw plant costing $55 million and Commonwealth Edison Co to construct a 185,000-kw plant costing $45 million. Forty-four companies are participating individually or in groups in planning seven large and medium size atomic reactor plants as well as two small plants. These plants will have a generating capacity in excess of a million kw and will represent an investment of about $300 million.

This is a gratifying record of achievement in view of the fact that only within the past two years has the Atomic Energy Act permitted utility companies to participate. It demonstrates that the so-called "crash" program, calling for six federal atomic power plants to be immediately constructed, is unnecessary and undesirable and probably would serve only to retard American atomic progress.

Our Foundation Is Good Service, Low Rates

I am optimistic because our industry has continued its ceaseless search for ways to serve the ordinary American with electricity cheaper and more efficiently than ever before. The foundation stone of our industry is good service at reasonable rates. Without this foundation the whole structure of our public and governmental relations would collapse.

You have not only met the nation's soaring demands for energy and capacity but you have maintained an adequate reserve. You have projected the ever-growing demands for electric power into the future and made your plans for supplying these demands. You have been able to obtain the enormous capital funds required for your expansion programs in competition with other and unregulated industries.

We're on Our Feet Again and Fighting

Through increased efficiency in the use of fuel and through the greater use of automation in your generating plants, substations, billing offices, and other operations, you have kept the average price of electricity at a level lower than it was before inflation had driven up the cost of virtually every other commodity and service including particularly the cost of government.

Our industry is not only bringing the benefits of electrical living to its customers but, at the same time, it is rekindling among our own people the commercial spirit without which we cannot hope to achieve our true potentialities of growth and expansion. This year our industry has literally "come up off the canvas" to slug it out with the opposition. And we have found that the opposition is not only vulnerable but much less a public favorite than we had been led to believe.

The only question is whether we have the stamina to stick it out—to keep hitting back—finally to turn apparent defeat into victory. You can't beat a fighter who won't be beat.

Utilities' Public Support Growing

C. E. PARKER, President, Central Survey, Inc

"Electric power industry has come a long way in gaining its present public support" "Problem 20 years ago was winning majority support . . . problem now is making that support effective" "Many people think that power is a byproduct of flood control"

When people are satisfied with electric rates, the public makes no great matter of whether federal power or municipal power is expected to cost less. But when rates are under criticism, people are more responsive to the offer of cheap power from a federal or municipal project. Public opinion about the cost of electric service is influenced not so much by rates as by impressions acquired from advertising, person-to-person discussion, or other sources.

Opinions about the cost of service affect customer attitudes about a utility company in many other ways. When approval of a company's service declines, the public takes a dimmer view of the reasonableness of the company's profits, the courtesy of its employees, the liberality of its donations to worthy causes, and its participation in community activities. Frequently the public sees industry issues in the light of a decision by Congress, a federal or state commission, or even a city council.

TVA, Dixon-Yates Cited

These are all filters through which the public views an issue. Another filter is the presentation of an issue by advocates on either side. One-sided presentation is likely to be accepted, regardless of its merit. TVA and Dixon-Yates illustrate this. There have been many local issues in which public acceptance was obtained for one alternative because only it was adequately presented.

Distance also affects public perception of an issue. A federal project of maximum importance receives less than half the public attention 100 or 200 miles away that it gets within a 25 to 50-mile radius.

Wherever people compare the electric power industry with other businesses, they cite the electric industry's fine service at low cost, quality of personnel, citizenship in the community, and other favorable aspects. Yet there are gaps in the public's awareness of industry's activities. People are seldom aware of what utilities do to increase capacity, and seldom see all the implications in government ownership.

There are blind spots about farm electrification. Even rural leaders in areas of co-op activity are surprisingly uninformed about the proportion of farms electrified in their states or in the country. The companies are not given credit for their efforts in rural electrification. Even in states where companies serve more customers than co-ops, 55% of rural leaders interviewed said that co-ops served more.

In a study of 2,500 co-ops in four states, it was found that only 4% knew co-ops have preference over private companies in the purchase of federal power. In states where there were specific proposals for REA generating plants, only 8% of co-op members said they knew anything about them.

Many people believe flood control is perfectly consistent with hydro-electric power. They think power is a natural by-product, cheap and plentiful because water is cheap and plentiful. They believe it is natural for the government to sell power to help pay for other benefits. Such misinformation is largely the product of one-sided presentation.

How the public reacts to claims and counterclaims can be measured over a period of years. Measurement shows the electric power industry has come a long way in gaining public support. A 2-to-1 preference for public ownership and for extension of the TVA idea was revealed in a survey 20 years ago. Ten years ago support for private ownership had increased to 64%.

Private Ownership Loses Foes

ECAP surveys have shown a decline of about one-third in answers unfavorable to private ownership, its rates, or its profits. Trends of the times and conditions, aided by the industry's vigorous resistance, have at least held in check the usual trend of opinions.

When an issue first arises, there is no consensus about it. There is an instinctive resistance, a back pressure that builds up against whatever is new, strange or unfamiliar. This back pressure gradually weakens and a consensus develops in the direction of public acceptance. Finally there is a break-through, and the idea is accepted widely.

The course of opinion trends on social security has not been the trend regarding federal ownership of electric power. This is true by virtue of the industry's effort.

What is significant is that opinion trends must be stopped at the break-through point.

Reactions differ substantially, depending on whether the issue is national, regional, state, or local. On an issue of national government power the public is indifferent. On a question of municipal power tremendous interest may be generated.

The success of the industry's defense against more sweeping federal encroachment might suggest that it need do no more. What need is there for sharper insight into public attitudes? Why does it need to do a better job of opposing government ownership? The answer may be that the whole problem has changed.

Common Denominator Seen

The problem 20 years ago was winning majority support for the industry. The problem now is making that support effective. Most errors in appraising public opinion seem to have a common denominator. Here are examples:

1. Assuming that the public is very much interested in the industry's problem. Aside from getting good service at reasonable rates, there are very few industry problems in which the public has any interest.

2. Assuming that the voter is as interested in national as in local issues. Local issues affect him directly; national issues are farther off.

3. Assuming that employees are well informed on major public or governmental relations problems. Even among utility supervisors there are serious information gaps.

4. Assuming that people act on information in reaching conclusions. Gallup has pointed out that even after an idea has been accepted intellectually, there is normally a long time lag before it is incorporated into thinking.

5. Assuming that a just cause stands on its own merits without interpretation and demonstration of those merits to the public. The Dixon-Yates controversy proved otherwise.

6. Assuming that expressed opinions and convictions are the same. Most people are now inclined to prefer private ownership in the electric power industry. But this is not a firm conviction.

7. Assuming that opinions mean willingness to do something about an issue.

8. Assuming that opinions and action will be consistent. Voters' decisions are based on a variety of inherited and environmental influences as well as highly complex patterns of information, misinformation, and opinions. Among these influences the public power issue has no great prominence.

9. Assuming that reasons influencing utility people influence others. Arguments related to free enterprise appeal most to people already on that side. This line of reasoning wins very few converts.

10. Assuming that decisions once taken will stand. When a decision favorable to the industry has been made, the industry at times has neglected to reinforce the decision by building public support for it. New Johnsonville is an example of this; Dixon-Yates, another.

Atom Plants Need Public Consent

"In atomic energy this industry has a new tap root reaching back into the basic energy resources of nature. It is our responsibility to process that energy and deliver it to our customers. But we must let our customers know that we're doing it."

JAMES F. FAIRMAN
Vice President, Consolidated Edison Co of New York, Inc

There has been definite progress on atomic energy. Design work on many projects has proceeded according to plan. The Shippingport Plant is well on its way to completion. Research and investigation have rolled back many frontiers. We are now in the second year of the commercial nuclear industry. And prospects of this young industry appear good.

Now its the future that concerns us—the future of the nuclear industry as well as that of our own electric utility industry. I have no doubt that we will solve the technical problems. But there is another problem—equally or perhaps more important—which we must tackle without delay. That is the problem of public consent.

Today electricity is established as the prime energy

business. It is not a simple business. There are some 300,000 at work in this country's electric utility companies. This is a large enough field in which to work out our individual aspirations. We might act as an entirely self-contained unit and ignore the rest of the population. But this temptation we must fight.

We must never forget that it is public consent that keeps us in business.

Public Consent Essential to Business Life

Public consent is a triangular affair involving company personnel, investors, and the general public. There can be divergent points of interest, but final decisions must fall within the parameters of these three viewpoints if they are to endure.

In the American scheme of things this granting of public consent is often a noisy affair. Perhaps this noise is the principal reason why strangers find it so difficult to understand us. They mistake the sound and fury for the substance.

The noise in the atomic field during the past year is typical of our way of doing things. But in spite of the clamor progress has been steady. Power reactor plans have gone through successive blueprint stages. More test facilities are under construction where calculations can be checked and rechecked. The industry, with a substantial stake in the atom, wants to be as sure as is humanly possible that it is proceeding sanely and safely.

The industry feels that competitive electric power from the atom cannot be forced in a hothouse atmosphere of government funds. Instead, it should be handled like all the many successful innovations that have been adopted over the years.

Lured by early publicity, investors rushed into the atomic field as if it were another Klondike. Many ventures proved to be sub-critical, in atomic terms.

These early excesses are being ironed out and we are left with the impression that the investing community, particularly their technical advisers, are fully aware of the atom's potential.

The general public is the remaining factor. The general public is not yet with us in the application of atomic energy to the generation of electricity.

Here we have a once-in-an-industry opportunity. Except for the Shippingport plant, which will be in operation next year, nearly all our projects seem scheduled for operation about 1960. We have almost four years of detailed design and actual construction work ahead.

Tell Public Atomic Facts of Life

In this interim, we should make the most of our opportunity to explain the facts of atomic life to the public. This will not be easy. But it does seem that experts in the field, given the proper amount and type of support from the industry, should be able to do this job.

There are two mental blocks in the public mind as far as atomic energy is concerned:

The first, of course, stems from the original use of atomic energy as a destructive force.

The second is the complexity of the subject.

It seems to me that emotional fear of atomic energy can be removed by placing emphasis on the positive benefits of this new fuel. It also seems to me that atomic energy can be made fascinating and human. This would do a great deal to remove the second mental block.

In any case, something must be done to bring the story of atomic energy in the field of electric generation to the public within the next few years. Our recent experience in New York indicates the job can be done.

Opinion Survey Shows the Way

We have just completed a public opinion survey in our territory—New York City and Westchester County—which included some questions on atomic energy.

We found that 22% of the people in our area knew we were involved in applying nuclear energy to power generation. In Westchester, where our nuclear power plant will be located, 29% had heard of our plans. Next we found that only 25% of people in the city favored development of atomic electricity by private enterprise. This contrasts with the 43% endorsement of private enterprise in the atomc field found by the recent Opinion Research Corp study of national opinion.

The drop from 43% endorsement nationally to 25% in New York City reflects some differences that distinguish the city from the rest of the nation. In Westchester, however, we found 35% favored development by private enterprise.

We told those who didn't already know it that Con Edison was working to use atomic energy for electricity. And we asked if they thought this development was a good idea. 60% of the people involved in our study thought that it was a good idea. Yet, earlier in the quiz, only 25% thought private enterprise should undertake this venture. But 60% thought it would be a good idea for Con Edison to do it. Even among those who originally favored government development when first asked on a broad basis of ideology, a total of 55% thought it was a good idea for Con Edison to go ahead with atomic plans.

Appeals Based on Ideology Fail

The main lesson we learned is that in New York City, we cannot appeal for support on the basis of ideology, political philosophy, or broad generalities. We must use our own name.

Among the fifth of the people who knew we were active in the atomic field, before the interviewer called on them, some 84% thought it was a good idea.

The difference between the figures is large. With the old argument of private enterprise we find 25% support for our atomic plans. Add the information that the local utility is interested and the vote of confidence rises to 60%. Increase this information with just a few details about the plant and the favorable vote goes to 84%.

Public acceptance is something we need badly in this business of ours. Occasions when we need public support are following each other more closely these days.

In atomic energy this industry has a new tap root reaching back into the basic energy resources of nature. It is our responsibility to process that energy and deliver it to our customers. We must let our customers know that we are doing it.

If we do a good job of producing and distributing our energy to our customers, if we do a good job of spreading the word that atomic electricity is being brought to market in line with the principles of the American economic system, we will welcome any occasion when the chips are down and the committees with the high sounding names are organized. By our good works we will have earned public consent.

What's on America's Mind?

BOYD CAMPBELL,
Board Chairman,
Chamber of Commerce of the United States

"This leap-year event (election) could be a stimulating and inspiring proposition, a re-examination of government practices, a re-appraisal of political and economic policies, a re-assessment of social accountability—a workshop on citizenship."

During the past twelve months I have had an experience that comes to few American businessmen. As the representative of a great federation of business organizations, I have been across the length and breadth of our national landscape. The distance was more than 120,000 miles.

In 124 communities, I visited with you and talked to you and thousands like you—singly and in groups. More importantly you talked to me. You talked about the current issues and public questions that affect the well-being of our beloved country.

First of all you talked about business—as it was, and as you thought—or hoped—it would be. Last summer and fall, you looked forward to the turn of the year in anticipation that 1955—by national standards—would prove to be our finest business year. And it was.

In planning for 1956, you were hopeful and confident. Now, here we are, with one third of the year behind us, and most of our economic forecasters believe that 1956—on balance—will be a better year than 1955.

You frequently raised the question about the continuance of good business.

You recognized your own responsibilities for a stable and expanding economy, and you were making plans accordingly.

You in the electric utility industry were always in the vanguard with plans for expansion—big plans, requiring big vision and big money.

You also recognized that higher levels of business would depend, in large degree, on wise tax policies and sound fiscal policies of government.

While you did not spell it out in so many words, I am convinced that you share my opinion that our high level of prosperity is an almost perfect tribute to the workings of a free economy.

You were concerned—and very genuinely so— about the plight of your friends, the farmers, your fellow business men in agriculture. You were troubled because agriculture was not sharing in the prevailing prosperity.

You felt that the farm problem had been vastly complicated because politics had become interwoven with it.

If I am reporting correctly, you are convinced that the problem may get worse before it gets better.

You know, however, that the economic softness of agriculture cannot continue indefinitely without becoming a hazard to our national welfare. You have not claimed to know all the answers, but this you do know: Any real answer must be based upon economic principles rather than political considerations.

You Are Worried About Taxes

Then—taxes. Everywhere I went, you talked about taxes. In essence you said: "Taxes are too high."

Maybe you've always said taxes were too high. I've never heard you say taxes were too low—or even just right. A system of taxation that is based upon political expediency and puts a premium on "tax angles" rather than good management, undermines your confidence in its equity, and without equity, no system of taxation is tolerable or enforceable.

You were worried not only about the tax burden itself but about what our tax structure does to initiative, venture capital, and opportunity. And that means that you are for a system of taxation that inspires initiative, magnetizes venture capital, and broadens opportunity.

You are thinking about tomorrow and what it holds for young people. There is nothing negative about that.

You expressed strong opinions about government in business. First, last, and always, you are against the competition of government in economic areas where private capital is able and anxious to do the job.

Instead of amplifying your opinions, I shall condense them into one emphatic, unequivocal statement. You said: "Let government get out of business!"

What business do you want the government to get out of? Do you want it to get out of business that is nearest to you and against which you are waging a losing competitive contest because of capital subsidies or tax subsidies, or both?

Of course you do. You abhor the inequity and proclaim your adherence to private enterprise as a principle. But are you equally vehement on government competition

in areas that are not at your doorstep but in which the identical principle is involved, probably on a much larger scale?

And suppose that you are a beneficiary of a government subsidy in business—a business competing with some one else, but not you—would you still want the government to get out of business? With deference, I suggest that we could use much more economic understanding and much more consistency in this segment.

What about atomic energy? You believe that the government should release its warehouse of nuclear secrets to private enterprise for continuous research and development for medical and industrial use. There should be no strings attached except those absolutely vital to national defense.

You are not concerned with the "give-away" cry of the demagogue and the left-wingers. You are concerned with making the most of our vast investment in nuclear research, and you know it will be expedited in the great research laboratories and industrial establishments of American private enterprise.

What did you say about Hoover Commission recommendations? Not enough. Not nearly enough. True 99.44% of you were for the recommendations of the commission—which we usually call the Hoover Report.

While you were emphatic and highly articulate on the subject of taxes, the same emphasis did not carry through on the Hoover Report. This is paradoxical—because adoption of the report would provide the tax relief you so earnestly seek. Likewise, it would accomplish your vigorous demand that the federal government remove itself from competition with private business. To get its recommendations translated into law will require the full force of your informed, united, and sustained effort. It will take leg work, head work, and heart work.

And then, you spun the globe.

You have been intrigued, amazed—and if I am not mistaken—somewhat amused at the fantastic Russian spectacle. Among the many grotesque contradictions in this situation is that the same old gang is ruling Russia—minus Stalin. It is the same old gang with a brand new look.

There is nothing you would welcome more than a true change of heart in the rulers of the Kremlin, because deep down inside each of you is a love of peace—and the hope that it may eventually prevail throughout the world. When she has repudiated her diabolical purpose to rule the world—then perhaps it will be time to take her new look seriously.

Finally, the election year—the year in which a legion of candidates are advancing their personal and party claims to public office. Among them are those who seek election to the most powerful position in the world—the Presidency of the United States.

This leap-year event could be a stimulating and inspiring proposition—a re-examination of governmental practices, a re-appraisal of political and economic policies and a re-assessment of social accountability. In short—it could be a workshop on citizenship.

National Balanced Budget Urged

FREDERIC R. COUDERT JR
Member, U. S. House of Representatives

"Currently there's no procedure to assure a balanced budget. We need a procedure which will limit federal expenditures to revenues and put an end to deficit financing and incurrence of debt except in time of war or other national emergency."

Consider if you will that our entire national debt has been paid off—all $276 billion of it. Consider also that for years the U. S. Treasury has been "harassed" by surpluses. Wouldn't we in Congress have a field day!

This impossible dream—1956 variety—was a reality 120 years ago. In June 1836, Congress faced exactly my dream situation. The national debt had been paid off. Annual surpluses were mounting. What to do! Magnanimously, Congress voted to distribute most of the surplus to the states. But a postscript is needed. Half a century later, the states were still suing (Ex parte Virginia, 111 U. S. 43) to collect final installment.

The Congress of 1956 or 1957 or any year in decades yet to come will have no problem of distributing surpluses

of a debt-free Treasury. Our quarter-of-a-trillion debt is likely to remain with us for a long time. Rather, the problem is to enact a plan to prevent a return to deficit financing and more debt. A small surplus is in prospect for the current fiscal year, but surpluses have been the exception rather than the rule. Deficits in 22 of the last 25 years are enough to cause deep concern.

The central thought that I wish to put across is the importance of writing into law an important principle of orthodox finance. I wish to require that the national budget be balanced year in and out. Currently, there is no procedure to assure a balanced budget. We need a procedure which will limit federal expenditures to revenues and put an end to deficit financing and incurrence of debt, except in war or other grave national emergency. Congress needs a debt-preventing tool such as many states have.

There are those who pooh-pooh the importance of living within income. Others pay only lip service to this most elementary common sense financial principle. The leaders of this Administration have been striving—and striving successfully—to restore financial soundness after years of waste and reckless spending.

Achievement of budgetary balance which is assured for fiscal 1956 is, I agree, an important accomplishment. It is largely the result of a determination to hold down expenditures. But—and I do not mean to belittle the accomplishment—the balance this year, as in the only other 3 years of budgetary balance since 1930, is somewhat inadvertent. It is fortuitous. It results principally from an underestimation of receipts. A balanced budget should be the rule rather than the exception. But a continuous budget balance can be achieved only with a set of hard rules. We must make it unlawful to pay out more than we take in.

Congress Needs Law to Stop Spending

Let me tell you why. We need a rule to help members of Congress to resist pressures for spending. The actualities of politics are such that members are extremely vulnerable to demands for spending. Further, there is always someone with a theory to rationalize any action, however bad. Some theories sound pretty silly; but as a drowning man clutches at a straw, so Congress and Congressmen justify a course of action by reference to an economic theory which common sense tells them is wrong.

Since the days of Rome sovereigns have resorted to all sorts of trickery and financial juggling. Bankruptcy has been disguised by pretended payments in debased currency; sovereigns adulterated the coin. There is certainly a moral to be learned from the inflation after World War I. We see today the results of national deficits in 22 of the last 25 years. The 1956 dollar is worth only 50¢.

Not only do I contend that business does not need an unbalanced national budget, but I think business does not wish it. To make sure that we don't get detoured from the road that leads to a balanced budget, we need positive action, preferably a constitutional amendment. We need a statute which limits federal expenditures to the sums the taxpayers are able and willing to contribute to their government. Existing practices do not control at all.

If we establish the principle that tax receipts shall determine expenditure levels, we will restore Congressional control of expenditures because we can control taxation. People will defend themselves against taxation in a way which they are unable to do on a item-by-item appropriation process, where pressure groups and special interests are so often unbeatable. So long as we continue the power to borrow and go into debt, we make for irresponsibility in government.

Congress needs protection against pressure groups. My proposals help provide just that. So often the pressure group which one day pushes us to spend, the next day pushes us to reduce taxes. If we had an over-all expenditure ceiling, we would be in a position of saying "That's all there is, there isn't any more."

3 Steps to Insure Balanced Budget

Mechanics of my proposal for insuring that expenditures shall not exceed revenues are simple. Controls will operate at three points. The first comes with the budget itself, by requiring the President to submit a balanced budget. The second operates upon the Congress in forbidding enactment of appropriations in excess of estimated revenue. Finally, notwithstanding obligational authority granted or appropriations made, the President shall take action to insure compliance with the budget.

The American people have become so conditioned to deficit financing and its apologists that many will instinctively question my limitations. These people fear a possible impairment of the defense effort. I have two answers. Any defense based on an inflationary economy, resulting from continued budget deficits and a continuing declining dollar, is based on sand. Financial soundness, a defense based on a balanced budget, with taxes that the people can bear over a period without diminishing their incentive, initiative, and ultimate productive power, is real defense.

Under some circumstances there may be a necessity for expenditures that cannot be matched immediately with revenues. To care for that situation I would allow the incurrence of deficits under two sets of circumstances: In war declared by Congress and during a grave national emergency declared in Congress by a concurrent resolution accepted in both Houses by a two-thirds vote.

You may want to know what I think about tax reduction and debt reduction. President Eisenhower and Secretary Humphrey are quite within their rights when they urge caution in seeking tax reductions based on estimates of what the Treasury surplus is going to be this fiscal year. Both have too much responsibility to set about disposing of something they do not yet have. They urge that whatever surplus we have should be devoted to retirement of some of our debt, and that is good.

Congress Must Regain Control of Budget

I believe that there is nothing more important than for Congress to regain control of the budget and achieve the right kind of tax reduction so that we may confront the future with an assurance that we cannot possess today. The federal deficits of past years have been the largest element in this inflationary period. I believe that deficits have been largely the result of unnecessarily grandiose spending schemes of officials in the Executive Branch. Very often they have been well-meaning, but the results, for whatever reason the deficits were incurred, have been and continue to be dangerous. I must not pass all the blame to the Executive. We in Congress must assume our share as well, particularly in our failure to institute the proper controls. It is difficult to understand how anyone can fail to support a procedure by which a balanced budget can be reached.

Federal Power Rates Unsound

FRANK T. BOW,
Member,
U. S. House of Representatives

"The plain mandate of Congress, that rates for power shall be fixed according to sound business principles is being disregarded. In my view this applies to the Army Engineers, the Department of the Interior and the Federal Power Commission."

It lies within the authority and likewise is the duty of the executive agencies to establish federal power rates in accordance with sound business principles. In this respect those agencies have been greatly remiss. In general, this matter of rates has been viewed from the standpoint of short-term advantage for relatively few, instead of the long-term advantage of the whole citizenry.

Without taking time to go into the genesis of Section 5 of the Flood Control Act of 1944, I quote the vital first sentence thereof:

"Electric power and energy generated at reservoir projects under the control of the War Department and in the opinion of the Secretary of War not required in the operation of such projects shall be delivered to the Secretary of the Interior, who shall transmit and dispose of such power and energy in such manner as to encourage the most widespread use thereof at the lowest possible rates to consumers consistent with sound business principles, the rate schedules to become effective upon confirmation and approval by the Federal Power Commission."

The criterion established by Congress in the Act of 1944 for setting "the lowest possible rates" is neither the practice of charity, in the form of subsidies, nor discrimination between groups of citizens in respect to rates of charge for power, but rather sound business principles. The statute mentions nothing else.

Even if we were to consider that "sound business principles" shall control rates in the cases only of Army Engineer projects, they comprise almost ⅔ of all federal hydro-electric power development, taking into account those in operation, under construction, and authorized.

Let us examine the application of sound business principles to elements entering into fixing of rates for federal power. A fundamental—a sound—business principle observed by individuals, banks, and other institutions lending money is that the charge for use of money shall be at least as great as the cost to the lender.

What is the cost of money to the federal government, that is, to us taxpayers? Surely it is not merely the direct charge for interest on the respective bonds, certificates or Treasury bills. Total cost must include that of floating loans, including refunding where this is involved, all accounting, and where applicable, the proportionate costs of tax collection. At no time has even the mere interest on long-term Treasury borrowings averaged as low as 2%; yet the Department of the Interior has used that figure, though more recently 2½%. Estimates of the complete cost of federal money run from a minimum of 3½% to more than 4%.

In Sec. 5 of the Act of 1944, the prescription is "a reasonable number of years." Period now used by the Army Engineers is 50 years; Bureau of Reclamation, a minimum of 40 years with a permissible 10-year allowance for getting underway. Increasingly there is pressure for use of longer periods—60 years, 70 years, and in recent proposals, 100 years.

Various bodies of experts have recommended an amortization period of not more than 50 years. Surely, in the light of what is facing us by way of nuclear power, a 50-year period should not be exceeded.

Turning to method of amortization, there is no prescription in the Act of 1944 or any other pertinent statute. Present practice is to use the sinking fund method which results in equal annual payments for the sum of amortization and interest (on unamortized balances).

Under the sinking fund method, return of the investment into the Treasury begins at a minimum and, if all goes well, reaches its maximum in the last year of the period of pay-off. During the first half of a 50-year payout period, only about ⅓ is repaid.

But sound business principles require the reverse. Because of the uncertainty in respect of the future, particularly as regards nuclear power, federal projects should "pay out" at a more rapid rate during the earlier years.

A sound business means of accomplishing this is that method which requires equal annual repayments of the federal investment, not equal annual payments of the sum of amortization and interest on balances.

In cases of federal multiple-purpose projects, it is necessary to make an allocation of cost against the power purpose or function. Clearly, there should be allocated to power no less than is reasonable. Costs which belong

to power should not be allocated to functions treated as non-reimbursable, such as flood control.

Exemption of federal property from taxation has become burdensome beyond toleration. There is a growing movement to require the federal government, through local taxes on its property, to participate in supporting local governments and their services. Various bills to that effect are pending before Congress. Some would apply even to the public domain and establishments for defense.

Some 10% or so of all of the power consumers of the country are served with solely federal power and, therefore, as power consumers, contribute nothing at all toward the cost of federal government. Something of the order of 20% more of the nation's power consumers are served partially with federal power and, therefore, as power consumers, do not pay their full proportionate part of the cost of federal governmental service. This must be made up by other federal taxpayers, mainly by the customers of private power companies.

Most federal agencies have within the past year or two advanced in their thinking and practice to the point of requiring, for purposes of economic evaluation and comparisons with at least non-federal alternatives, the tax components of true cost be fully taken into account. But that procedure does not go far enough. Consistency with sound business principles requires that the corresponding taxes, costs and charges be included in the rates for federal power and borne in fair proportion by consumers. This may require action by Congress.

Although overheads are not a major element in rate making, sound business principles require that pertinent overhead costs of all kinds should be sufficient to cover those overheads.

No sound business would tolerate a condition whereunder pre-authorization of pre-construction estimates are forgotten as soon as they have served to bring the project into being. Yet in the case of federal projects it is fair to say that such earlier estimates or representations are disregarded. The Army Engineer estimate of the average annual benefits from the power of three multiple-purpose projects (Wolf Creek, Dale Hollow and Center Hill on the Cumberland River) totaled $11,223,000 whereas the power output was sold to TVA for $3,500,000 with subsequent increase to $3,950,000. We federal taxpayers are annually receiving only about ⅓ of what the Army Engineers estimated to be the average annual value.

In the Southwest, actual cost of federal power is greater than the market can afford. Projects have been badly conceived and probably shouldn't have been built.

At least so far as federal power projects constructed by Army Engineers, with the possible exception of including full tax charges in rates, the remedy lies within the authority—indeed the duty—of those administering Section 5. The plain mandate of Congress, that rates for power shall be fixed according to "sound business principles" is being disregarded. In my view this applies to the Army Engineers, the Department of the Interior, and the Federal Power Commission.

They Are Public Dis-Utilities

DR F. A. HARPER, Foundation for Economic Education, Inc

"If political agents violate these rights and confiscate property of others for the benefit of themselves and friends, that should be labeled a 'public dis-utility,' and those who carry out such schemes should be labeled 'public dis-servants'"

I propose to challenge the concept of a publicly owned utility as it has developed in our country. It is a concept that apparently continues to grow in favor. I propose to challenge it on grounds of our basic human rights of private ownership, and in the light of our traditional concept of private enterprise under private capitalism.

This concept arises from a perversion of our traditional idea of human rights. And it is there that we must start, because any opinion of justice must be founded on one's assumption about basic human rights.

The first and basic human right may be said to be the right to life. Except for this right all other human rights would be unfounded. In the absence of this basic right the others would become merely nonsense.

If there is the right to life, it follows that you have the right to sustain your life—to use your life as you will, so long as you do not violate the same rights of other individuals.

In working to sustain your life, you have the right to what you produce. This right derives its validity from the fact that life is sustained by the production of scarce things —economic things, desired beyond the available supply.

Flowing from the right to what you have produced is the right to keep it; the right to own property. Whether you keep what you have produced, it is your property until you choose to do something else with it. So the final right in this series of human rights, is the right to dispose of your property. When you do not wish to use it yourself, you may sell it or trade it or give it away. You are beholden to nobody under this right.

No Justice in Compulsory Ownership

The only concept of ownership consistent with these basic human rights is one in which ownership is strictly personal. It is clear that the personal and individual nature of the fundamental human right to life carries over into the derivative economic affairs of ownership, control, and the disposal of private property. There is no more justice in a compulsory, collective ownership or control of property than there is in a compulsory, collective ownership of life.

The power to extract from anything its economic worth becomes a means by which to confiscate all meaning and purpose of ownership. That is why control is the essence of ownership. So collectivized political control makes a sham of private ownership and private rights to property. The significance of such control supersedes the title which you may still have safely stored away in your strongbox.

It is possible to destroy the worth of your property by a more subtle method than arbitrarily setting your prices for you. Suppose that, in the "interests of the public" or whatnot, I set up a socialized competitive grocery. This, we shall say, is justified as a "pilot grocery, by which to test the fairness of your prices." Or perhaps it is "to prohibit you from gouging the public with exorbitant profits."

By undercutting your prices only a very little bit—only a fraction of a cent—I can draw business away from you. Realizing what is happening, you will probably cut your prices down to mine in the hope of regaining lost volume. But then I can cut mine below yours again. This can go on and on.

You Pay for My Losses

In this illustration I am not an ordinary private competitor of that sort, using my own funds. I have an almost endless pit from which to draw funds for my continuing losses. Why? Because mine is a socialized grocery store. As a part of the authority by which I am empowered to control your business, I also have the right to send you a bill for the losses sustained in my socialized grocery business.

This is the worst conceivable sort of competition—if, as I would deny, it can properly be called competition at all. Though I originally gained my power of control for the stated purpose of "eliminating cutthroat competition and stabilizing human welfare," mine is the power to engage in the most ruthless cutthroat competition conceivable. Whereas you must pay your own losses from your own savings, I can send you the bill for my losses too.

In the light of this, let us now appraise this popular term "publicly owned utility."

What is utility? To economists, utility is merely a thing desired. Or, it is something adaptable to human desire. Electricity when harnessed for our use has that quality.

What then would be a "publicly owned utility?" I suppose it should be something desired by the public, an abstraction to describe a composite of individual persons. Who else except individual persons could desire either the necessities or luxuries of life?

Weed Notion Threatens Heritage

The reason why such a term came to have acceptance is that sometime in the past there arose in the garden of ideas this communal weed notion. And it has been crowding out certain important traditional concepts. It threatens to take over, more and more, our rich heritage and to blight the origins of our economic fruitfulness. To stop its spread we must recognize it for what it really is, and apply the hoe. This weed notion is that there is a "public" —or "society" as it is sometimes called—which somehow exists apart from the persons who comprise it. Thus it is a supra-individual concept which assumes a social whole greater than its parts as separate, cooperating individual persons. And it is this whole which is now assumed to have certain rights denied persons who comprise society; a "social good" distinct from individuals' good; a "public welfare" somehow greater than the sum of individual personal welfares.

From this has sprouted the notion of this special category of utilities—those utilities presumed to somehow apply peculiarly to the communal mass of humanity rather than to be the proper concern of persons as separate individuals. But as already explained, this concept of a communal mass is itself sheer nonsense from the standpoint of justice. There is no such distinction between the utilities of different economic goods and services.

Out of this notion has come the idea that it is fitting and proper for the political agent of the communal mass to either own or impose arbitrary control over public utilities. It is argued that the public should control what belongs to the public.

Public Ownership Is Dis-Utility

I would stress that processes now so generally accepted and endorsed as justifying communal ownership or arbitrary control of public utilities must be recognized for what they really are—socialism or communism. And in the light of human rights and freedom, these are the processes that destroy the dignity of man and paralyze enterprise.

It is for this reason that I would rename political ownership and arbitrary control of these services, using instead the term public dis-utility. For is it not an act of public dis-utility to destroy the value of property which has been rightfully acquired by private individuals? Since the public is only private individuals, there can be no public utility that is not basically private utility.

We must, as I see it, preserve the basic rights of private individuals to acquire and use as private property whatever they have produced or otherwise acquired without theft. If political agents violate these rights and confiscate the property of others for the benefit of themselves and their friends, that should be labeled a public dis-utility, and those who carry out such schemes should be labeled public dis-servants.

Dollar Value Must Be Protected

"Cost inflation raises capital requirements. It is perfectly true that in electric utilities you are buying more kw of generating capacity per dollar than you did ten years ago, thanks to technological progress—a great point in your case."

ALAN H. TEMPLE,
Vice President
First National City Bank of New York

In the period 1936-1945 gross sales of all U. S. corporations increased about twice as much percentagewise as those of investor-owned electric companies. Utility gross sales were held down by repeated rate reductions (while general prices soared) and wartime restrictions on expansion. During the 10 postwar years, however, both groups increased their sales at about the same rate. Utilities, cutting their prices still further, increased theirs 130%. All corporations even with rising unit prices increased their only 128%.

Net income brings out even more strikingly the relative stability of utility earnings, which show none of the jaggedness characteristic of all corporations. It shows a threefold increase in the dollar net income of the utilities in the past 20 years.

In the utilities, unlike most other lines, a large proportion of the capital invested is represented by funded debt. Thus their rate of return on total property investment is substanitally lower than on net worth alone. What we are comparing is what is left for the owners. The significant point is that the electric utilities fall into a stable middle position. They do not show the erratic fluctuations found in many other lines.

While the utility stockholder accepts a smaller average rate of return in prosperous times, he enjoys greater stability of return; and if and when we have depressions again, his returns can be expected to hold up much better.

Net income in cents per dollar of gross revenue, when I spoke in 1948, was at the low point up to that time. With lower selling prices, higher costs, and markedly increased taxes, the declining trend had been a long one, interruptions only temporary. It was the warning signal on which my talk was centered; for if this decline had continued, the ability of the industry to raise the immense amount of new capital that it has needed would have been impaired. Fortunately since 1948 the line has leveled out, interrupted only by the inflation year 1951.

Since the utilities have a much larger investment per sales dollar, or conversely a much lower rate of capital turnover than manufacturing corporations, they must have higher profit margins to survive. Manufacturing industries generally have shown no such long-term declining trend as the utilities, while railroad margins have shown a rising trend for 10 years, of course from a very low level. The fact that the utility industry has prospered on the 18¢ margin of the past 5 years is a magnificent illustration that growth in sales and high load factor can compensate for lower selling prices and higher costs.

During the 20-year period the widely used U. S. Bureau of Labor Statistics index of consumer prices, now based on the average of the years 1947-49 taken as 100, rose by 95%. In other words, general prices almost doubled. In the same 20-year period, the average revenue per kwhr of electricity for residential service declined by 47%. Despite cost inflation the average revenue per kwhr was lowered by almost half. This reduction in selling prices is a tremendous achievement, a triumph of management, engineering skill, and technical progress.

Let me sum up certain factors. First, let us consider the changes that occurred between 1935 and 1945. In that period your total output increased 103%, although your plant and equipment account was actually reduced 3% through depreciation and accounting adjustments. It is plain that the use of plant was greatly intensified, since output was doubled. Total revenue, however, rose only 69% and net income only 30%. This was a very unsatisfactory and indeed an alarming showing. It revealed the effects of inflated costs and taxes, declining selling prices, and wartime inability to install modern equipment on net profit margin. It ran absolutely contrary to the experience of other industries, whose net rose even more than physical output and gross revenue; and it was a reason for profound concern in light of the industry's coming capital needs.

Now look at the ensuing 10 years from 1945 to 1955. While the plant and equipment account rose 112%, plant utilization continued high, output rising 132%. The encouraging fact is that gross and net both rose by similar percentages. This, of course, does not signify that margins have improved since 1945, only that the erosion was checked.

These are salient points of the earnings record that your

industry brings to the capital markets. In the years to come your output and hence your capital expenditures must increase tremendously to meet the needs of a growing population, an expanding economy, and a rising standard of living. The estimate of Electrical World, that your capital expenditures will rise in 1970 to $7.8 billions in 1954 dollars, is typical. This figure makes no allowance for rising costs. If it is a reasonable estimate today, the actual outlays by 1970 will probably be much higher.

Where is this money coming from? One popular way of dealing with this question is to make forecasts of the total supply of and demand for corporate and mortgage funds. Future capital demand is as elastic as the wants of the people. It is surely affected in some degree by the price of the capital and by the optimism or pessimism prevailing at any given time. It is affected by technological developments and by extraneous and unpredictable political or international influences.

Cost inflation raises capital requirements. It is perfectly true that in the electric utilities you are buying more kw of generating capacity per dollar than you did 10 years ago, thanks to technological progress which is a great point in your special case. Between 1945 and 1955 total construction outlays rose from $5.6 to $42.2 billion. If all this work had been carried through on the basis of 1945 costs, actual outlay would have been close to $22.6 billion.

What is the effect of inflation on the other side of the equation, on the willingness to save and the accumulation of capital? As costs inflate, incomes inflate also, and potentiality for saving tends to expand somewhat in proportion. Personal savings today are far larger in dollar than in prewar days and so is retained income of corporations.

The decline in money rates, the rise in the taxes, and the cut in the value of the dollar have reduced the purchasnig power of the bondholder's income to less than 40% of what he was getting in 1930. The small stockholder, subject to the lowest tax rate, is the only one who has ended up even or better. The "well-to-do" and "wealthy" stockholders have lost heavily despite dividend increases. Their high tax rates and doubling of living costs have whittled away the purchasing power of their income.

The belief that the low interest rates of the late '30's and '40's represented a new era was based on three principal ideas. First, that capital is more efficient so that a greater output can be obtained from a given expenditure. Second, that economic progress provided people with a wider margin above subsistence needs and hence a greater margin for saving. Third, that central banks would maintain low interest rates to reduce the cost of carrying debt and promote growth. This is not true when inflation exists. It now seems that we should give consideration to other factors, namely, to the effect of rising costs in inflating capital requirements, to the effect on savings habits of the attrition of purchasing power during the past 20 years, to the effect of high and progressive income and inheritance taxes and of depressed money rates, and to the fact that an inflationary bias from the wage-cost price side stacks the cards against the lender of money at interest.

Labor, Industry Need Joint Program

MARK W. CRESAP JR, Vice President, Westinghouse Electric Corp

Provide practical means for management and labor leaders to get together to talk." "Electrical utilities and equipment manufacturers are one industry. Any contribution (we) can make toward more stable relations will be national contribution."

Management-union relations and electricity have a good deal in common. The vast majority of people are directly or indirectly dependent on both. But labor stability in electrical equipment manufacture is dependent not only on the efforts of companies making up the industry but also on the basic fabric of management-union relations throughout the country.

There are many differences between management and unions today. Their objectives differ on a number of scores, and there are wide divergencies on policies and techniques as to the respective rights and obligations of companies, unions, and employees. But as to the fundamental goals for the American economy, there is general agreement. Both management and labor want full em-

ployment and a rising standard of living. The poisonous influence of trumped-up class warfare has fortunately been demoted as an emotional implement in labor disputes.

In contrast with the vastly healthier industry-labor atmosphere achieved in this country over the years, communication between management as a group and labor leaders as a group has failed to make much headway. Each is prone to regard the other as representing a different kind of human animal. There is a little of the "cold war" touch.

Industry has a pressing interest to improve this condition. The relative harmony achieved recently has been made possible in large part by a 10-year period of almost uninterrupted prosperity and increasing production. The real test will come during an inevitable future downward swing of the cycle, however distant this may be. The Marxian philosophy, which industry and labor have helped subdue, has rubbed off on enough people to pose a potential threat to industrial stability when conditions foster its spread. It is then that industry would benefit from a better understanding with labor leaders, built on effective intercommunication, as a cohesive force in a joint attack against this threat.

Labor too Needs Intercommunications

Labor has as much at stake in the stimulation of such intercommunication. Union leaders have acquired new problems with growth of organized labor, greater maturity of the movement, and recent creation of the consolidated master-union representing the greatest concentration of power in the country outside of the federal government. Much more will be expected of labor leaders by the public and by their own constituents than ever before. Premium qualities will be maturity, stability, judgment, progressiveness, and fairness.

There is no better way for labor leaders to demonstrate the qualities that their greater obligations will require than to display a willingness to develop closer fundamental relationship with management. And such a relationship is dependent on a much improved system for intercommunication.

Communications between managers and labor leaders are no substitute for direct and regular intercommunication between management and employees. Too many segments of industry have not fully appreciated the extent to which their fundamental relationships with their people are dependent on the uninhibited interchange of points of view.

Relations with Union Leaders Must Be Good

But even if good employee relations are sustained by effective communications, the need for good relations with union leaders still exists. It is easy to attack people you don't know, whether you are a union leader or a management representative. We all know how many times apparent problems disappear when we get to know the people involved. We all recognize the value of participation as a means of creating better understanding and acceptance of new ideas in our own affairs. It sometimes seems that we neglect these basic principles of human relations in dealing with people selected by our employees to run their unions.

At least in the beginning, an effective management-union communications program might be more likely to succeed if it avoided agenda, memoranda of understanding, minutes and all of the other formal trappings which are used as tools in other phases of labor relations. A great deal will have been accomplished if union leaders and managers get together around the dinner table as well as the negotiating table. In time more specific programming and accomplishment can develop.

The broad problem of improving management-union relations is best tackled, initially at least, at the company level. Otherwise it is not practical to expect noticeable progress on a broader basis. Nevertheless accomplishment of better relations through intercommunications between management as a group and labor leadership as a group, on a national scale, is an objective to which industry might well turn its attention.

There is no insurmountable obstacle. Differences in viewpoint are certainly no real bar to two-way discussions.

Leaders Must Meet Informally

The thought would be to provide a practical means for representatives of management and labor leadership to get together under relatively informal circumstances to talk over matters on which an exchange of thinking might be mutually helpful and which might well contribute to a gradual improvement in the country's industry-labor relations climate. The goal would be to facilitate intercommunication between industry and labor leaders to the end that both are more intelligently informed and thus able to do a more constructive job of dealing with their mutual problems.

A corollary benefit would be the opportunity for personal contact between leaders. This would have the tremendous value of wearing down useless suspicions and providing a better basis for discussing issues on their merits.

The responsibility for sponsoring the suggested program should be a joint industry-labor affair. An organization, or organizations, representative of all types and sizes of companies, could represent industry. The new consolidated AFL-CIO would be the logical agency to represent labor, although the substantial number of unions outside that organization should not be overlooked.

Organizations sponsoring the industry and labor groups could select representatives to attend each session. The total numbr attending should be restricted to stimulate discussion. Different representatives should be selected for each conference to permit deep penetration of industry and union leadership over a period of time. The exact form and arrangements for these meetings are distinctly secondary to developing a plan that, recognizing the interdependence of industrial and union leaderships, provides them a forum to communicate with each other as groups.

More Stable Labor Relations Will Pay Off

Electrical utilities and equipment manufacturers are in a real sense part of one industry. This combined industry depends upon uninterrupted employment, improved productivity, and a constantly increasing standard of living for the sale of its industrial and residential power and for the health of its market for electric products for the home. Any contribution our combined industries can make toward more stable labor relations will be uniquely vital to the future of our companies and will be a national contribution of the first order.

Public Power Is Threat to Unions

"Government agencies and subdivisions hold sovereign cannot abdicate its power and must fix wages, hours, and conditions of work of its employees by administrative order rather than through negotiations with unions representing employees"

GORDON M. FREEMAN, President, International Brotherhood of Electrical Workers

The basic economic objective of the trade union is the achievement of a collective bargaining contract which determines the wages, hours, and working conditions of the employees included therein. The process of collective bargaining gives the worker, through his union, an effective voice in determining his wages, hours, and conditions of employment. This economic democracy is not possible in many economic enterprises operated by the government.

It has been the experience of the International Brotherhood of Electrical Workers with municipally owned utilities, public power districts, etc, that legal rights to make agreements with management have been denied. This denial is based upon the view of these governmental agencies and subdivisions that the sovereign cannot abdicate its power and must fix the wages, hours, and conditions of work of its employees by administrative order rather than through negotiations with unions' representing their employees.

Public Owns Private Companies

The IBEW cannot support an arrangement which denies collective bargaining and results in the destruction of its local unions. Because of these labor considerations we have opposed and will continue to oppose the extension of government ownership and operation of power facilities beyond the actual necessities of the situation.

We recognize that government has a proper place in developing power resources when private companies are either unable or unwilling to do the job. It was for this reason that we supported such federal projects as TVA and Bonneville. But public necessity does not require government ownership and operation when private companies are willing and able to do the job. Today, however, we find that slogans of the past, based on practices and conditions which no longer exist, still furnish powerful political support for government ownership under the more attractive name of "Public Ownership."

I think it might well be recognized that the choice of words describing a given situation is quite important in determining public reaction. It has become customary to refer to government-owned and operated electric light and power plants as examples of public ownership. I believe that the industry has made a substantial contribution in emphasizing that so-called private companies are also owned by the public. It would seem to me equally important that electric light and power plants, actually owned and operated by government agencies, should be referred to as government-owned and operated.

There is another aspect of the preservation of American free institutions deserving of serious attention. I believe it is self-evident that institutions however free cannot survive if they are unworkable. On the other hand, Americans will not accept institutions which are not free, no matter how workable. It is, therefore, the joint task of labor and management to recognize and assume responsibility for the development of attitudes and procedures which by voluntary means will prove effective in guaranteeing the workability of our free institutions.

It is essential that an industry should produce efficiently the goods and services required by the public and that such economic elements as prices, wages, and profits be determined in such manner as is deemed just and fair by the consumer, the worker, and the investor. It is my conviction that both labor and management have voluntarily sought to discharge these responsibilities.

Quotes Taft on Compulsion

The electric light and power industry is particularly sensitive to public reaction when interruptions of production occur as a result of inability to settle labor disputes. Some would resolve this problem by arbitrarily prohibiting the right to strike in this industry. They fail to realize that the right to withdraw from production is an indispensable element of economic freedom. They fail to realize that interruptions of production are not caused by a desire to engage in such activity but rather by a failure of the parties to resolve a labor dispute.

Others would resolve this question by establishing a procedure for government compulsory arbitration coupled with a prohibition of the right to strike. I believe the best answer to this problem is found in the words of the late Senator Robert A. Taft of Ohio, in the debates which

took place in connection with the adoption of the Taft-Hartley Act. He made it clear that the proponents of the act were opposed to compulsory arbitration. He said:

"If we impose compulsory arbitration, or if we give the government power to fix wages at which men must work for another year or for two years to come, I do not see how in the end we can escape a collective economy. If we give the government the power to fix wages, I do not see how we can take from the government the power to fix prices; and if the government fixes wages and prices, we soon reach the point where all industry is under governmental control, and finally there is a complete socialization of our economy.

"If we begin with public utilities, it will be said that coal and steel are just as important as public utilities. I do not know where we could draw the line. . . . We have done nothing to outlaw strikes for basic wages, hours, and working conditions after proper opportunity for mediation."

The IBEW, together with employers in the electrical contracting industry, have developed a procedure for voluntary settlement of disputes without resort to strikes. It has been in effect more than 35 years. Its concept is very simple: Our Council on Industrial Relations is composed of equal representation from the two national organizations concerned. Care is taken to select representatives from various parts of the country. This council holds regular quarterly meetings to hear and decide disputes properly submitted. Every member is an interested party, fully aware of the practical problems of operation in the industry. Our experience with so-called "disinterested" parties causes us to prefer the thinking of those directly engaged.

Last month I participated in the regular quarterly meeting in St. Louis at which 22 cases were heard and decided. Each could have resulted in economic loss to the worker and the employer if the council machinery had not been available to render a final and binding decision. It must be understood that this is not a technique of compulsory arbitration. Parties to the local labor agreements voluntarily included therein provisions to use the council procedure whenever disputes could not be settled at the local level. The council prefers that all disputes be settled at the collective bargaining table and will not accept a case until good-faith bargaining at the local level has failed to effect a settlement.

I am convinced that a similar plan with appropriate modifications would prove of great benefit in the utility industry, and I suggest that it be given consideration at the national level.

The free enterprise system cannot be a one-way street. Collective bargaining is a basic requirement if the system is to operate fairly for both management and labor. I am greatly encouraged by a growing tendency in the ranks of both management and labor to look for the substance behind slogans. As long as we remain genuinely dedicated to our free American institutions we can look forward with confidence to better management-labor relations based on mutual respect for the rights of all parties.

Reliability Must Match Progress

"In this electrical age we have only one way to go; and that is toward the production and use of greater and greater amounts of electrical power, and the development of the nearest possible thing to absolute reliability"

B. L. ENGLAND,
President,
Atlantic City
Electric Co

Transportation, water supply, communications, fire protection, sewage treatment and disposal, refrigeration and food preservation, entertainment—the very life, the very safety of America, today depends upon a constant and uninterrupted flow of electricity.

Almost all the communities are increasingly dependent upon electric service, but it is the modern home that I chiefly think about. Here the reliability of electric service can seriously affect not only the comfort, but the lives of people. The average home, both urban and rural, already has enough electrical equipment so that a power failure can be a very serious experience.

We have sponsored this dependence on electric service because we in the electrical industry believe that complete

electric service is a demonstrable economic indicator of the success of our way of life. The increasing desire for free time for relaxation, healthful play and intellectual development mean an ever-growing demand for the substitution of non-interruptible service for manual performance of chores.

Electricity Has Created New Living Patterns

Electricity has not only replaced earlier forms of service, but like the automobile, it has created entirely new patterns of life for families, communities, business and industry. In this electrical age we have only one way to go; and that is toward the production and use of greater and greater amounts of power, and the development of the nearest possible thing to absolute reliability. Reliability of service has been a goal toward which we have been moving for many years. Progress has been outstanding. But the rate of progress in production and use of electric power has been faster than advances in reliability.

In that direction lies danger. The time has come to make reliability a major goal of all our development.

Because ours is a technical industry, it is not surprising that it is in the technical areas that we have made the proper progress in reliability, as well as in efficiency and economy.

A great deal of attention has been centered on improving the design and reliability of generating stations. The general direction has been to increase the automaticity of stations, thereby producing a number of reliability advantages. In addition, the reliability of the individual components of the newer generating plants is high and getting higher. Generator or boiler failures, after the initial breaking-in and settling-down period, are rare and getting rarer, in spite of increasing size and energy output. As things stand today, the generating plants are the most reliable portion of our electrical power system. It is to be hoped that, as atomic power comes into use, greater reliability will result from such installations.

It is the transmission and distribution of power these days that most frequently gets us into trouble. Naturally, this being the part of the system most exposed, transmission and distributoin may always be the weak link in service continuity.

Greater Reliability Is Possible

It need hardly be pointed out that great strides have been made in recent years in assuring more reliable performance of transmission systems. Greater reliability is possible, and we must strive for it.

The great enemy of fully reliable transmission, as well as distribution, is bad weather. Progress has been made in techniques of ice detection and melting by means of carrier current and temporary overvoltage. Yet in spite of all our modern technology, ice, wind, and storm still produce their havoc—and we have not won this battle yet.

Lightning also has produced its share of headaches for the power systems of the country. Yet lightning today has lost much of its ability to interrupt service. We have seen such progress in lightning control as would not have seemed possible a generation ago. Yet there remain many miles of transmission lines that are not as fully protected as we now know how to protect them.

More vulnerable than transmission to storm, accident, and other causes of outages is the distribution system. The closer we get to the home of the ultimate user, the greater is the number and variety of troubles that can result in power failure. In the distribution system the forces of the elements are often augmented by the forces of man to destroy continuity of service—and many are the ways in which the unexpected and the accidental combine to disturb performance.

There are not only wind, water, ice and fire—but trees, small boys with rifles and kites, the pileated woodpecker, and the pole-oriented auto truck.

Underground Distribution Is Not Answer

A solution often suggested for the distribution system's ills is to put it underground. Any utility operator experienced with underground systems, can tell you that isn't the whole answer. A partial solution to sleet and wind problems, it does not answer the problem of floods. Isolation of faults and clearing up of troubles are expensive and time-consuming in underground supply, despite network protectors. The underground system is difficult and costly to maintain to say nothing of installation costs.

Only where a community has an aesthetic problem, due to dense concentration of people and loads, can the underground system be contemplated, in my opinion, and there it should be on a contributory basis, leaving the rate structure intact for progressive improvement and ever-present invitation for increased electrical living.

The answer to distribution system reliability is not underground—it lies in greatly improving the overhead distribution system itself, with bold and major redesign. New structural and electrical designs are required.

Finally, we face another serious weakness in the chain of facilities between the generator and the household appliance—the interior wiring of our customers' homes. We get the blame for inadequate wiring and failures, even though we are not responsible. It seems to me our job is first to insist on a minimum capacity service entrance of 100 amp. We should insist on a service drop of at least three No. 2 wires, and interior wire sizes well above minimum code requirements.

Human Relations Important

We come now to human arrangements, and these are of the utmost importance, for no matter how perfect our machines and equipment may be, they require people to design, build, install, operate and maintain them. We must consider, first, what each individual company can do to assure the human side of service continuity, and what we can and should be doing in the industry as a whole.

On the company level, certain areas should be the constant concern of management, so far as the human or organizational side of service continuity goes.

The first of these is pre-planning. Every company should have complete plans for action in every type of foreseeable emergency, ranging all the way from a broken house supply wire to a major hurricane or other natural disaster.

The second is to operate such plans and keep day-by-day operations in first-class condition. Each company needs to expand every effort to develop a team of employees that is service-conscious—a team that is at all times trained, willing and able to see to it that the customer gets service without interruption. These must not only be good people, in the sense that they are intelligent, reliable, and able at their regular jobs. They must also have the kind of dedication to the job expected of railway enginemen and signalmen.

We Must Build More Engineers

L. R. BOULWARE,
Vice President,
General Electric Co.

"Any program for augmenting scientists and engineers that is unrelated to a concerted effort to encourage and educate all youth to maximum ability is too shortsighted for an industry whose interest in growth is as broad as ours"

Here in this populous country our most critical shortage is people—people adequately equipped with the required education and available at the right place at the right time.

In the long run, brain power may be the determining factor in whether we remain a first rate power, or whether we even survive at all.

A Congressional committee recently reported that the Soviet Union—which produced 682,000 specialists and technicians in the period from 1928 to 1954, compared with 480,000 for the U. S.—is now training twice as many as we are each year.

It is generally agreed that we need about twice as many graduates as the 45,000 we now produce each year.

We have evidence that there is adequate potential brain power present in the U. S. But half of the capable, and a third of the exceptionally-talented, is lost during the educational process—mostly in the earlier part of it. Obviously we cannot afford this prodigious waste of our most precious resource.

Only 3% Graduate in Science

For every 100 pupils entering the first grade, only 13 will graduate from college, and only three in science and engineering. If we could see to it that even a high proportion with the intellectual ability gets the kind and amount of education that will develop their optimum talents we would not only greatly increase the number of college graduates of all kinds produced each year—but we would have graduated about 75,000 scientists and engineers last year instead of the 45,000 actually produced.

Here is the critical chain of events in producing a scientist or engineer:

1. The number of scientists and engineers graduated depends on the number of freshmen with adequate preparation in math, physics, chemistry, and biology—and with the will and desire to carry through.

2. The number of high school graduates with these qualifications depends on the number who took the subjects.

3. The number of high school students who take the necessary math and science depends on how well and how early teachers, parents, business and industrial leaders help likely youngsters to appraise their opportunities, recognize their talents and hitch their wagons to science.

In the secondary schools our first order of business is to shore up the sagging emphasis on these subjects, to give them and the teachers status, and to begin to fill up the decimated ranks of math and science teachers.

This oversimplification highlights many specific points of application in our own communities for efforts:

- To improve student guidance and career counselling.
- To help teachers prepare themselves for better teaching, and to give them adequate equipment and aids.
- To elevate the status of math and science courses and of the teachers of these subjects.

We Have Not Been Alert

Our educated manpower problem today has resulted from our own lack of alertness—and failure to alert the students themselves. We have to admit that we have simply failed to guide and motivate enough of our youth in directions for which they were naturally qualified and where they would be most useful.

A plan to produce more scientists and engineers is by its very nature a long range plan. It takes 22 years to make a bachelor of science; 30 years to make a professional engineer or scientist. Even if we go back to the critical 8th and 9th grades—critical because it is the time for motivation to start math and science and thus change the students life—it still takes 9 to 12 more years.

I submit that any program for augmenting our scientists and engineers—that is unrelated to a concerted effort to identify, encourage, and more fully educate all of our youth to their maximum ability—is too shortsighted for an industry whose interest in growth is as broad and as fundamental and creative as is the electrical industry's.

There is another reason why we should encourage all students—the genius and the handicapped, the gifted and the crippled, the average and the above and below average—in their opportunities to develop to the maximum of their ability. Because it is right. And in the long run the

things that are right are the only practical and realistic things to do.

If we "belong to the ages" we have no alternative but to do what is the long-range and the high-grade thing to do. We do not live by today's kw alone.

Since 1945 General Electric has had a unique and rewarding experience in trying to help local schools equip teachers and stimulate appropriate studies to the end that a higher percentage of students will prepare for and pursue science and engineering careers.

In 1945 GE established the first of a series of summer fellowship programs for high school teachers at Union College, Schenectady.

Science teachers from 12 states are invited to apply for the fellowships which consist of six weeks of advance college training in their field. Tuition, room, board, and travel expenses are included. 50 fellows are selected.

Since 1945 11 groups of 50 summer fellows attended Union College. In 1947 a similar program for 50 high school physics teachers was established at Case Institute of Technology. In 1952 an annual program for 50 math teachers at RPI in Troy, N. Y. and in 1953 a similar program for 50 mathematics teachers was established at Purdue University. The four programs have provided 1,350 high school teachers from a 24 state area with summer fellowships in the two important fields.

A new annual program for 50 high school physics and chemistry teachers from 14 Far-Western States will make its bow at Syracuse University this summer.

The two original purposes of the summer fellowship program were: To refresh teachers in their subject through a graduate credit program offered by an outstanding university; and to place the teacher in a position to attract more students to his courses and motivate more student accomplishment by giving the teacher an intimate picture of the importance of the subject to the students' future.

Those of you from the larger utilities who are thinking of a program of this kind will most likely find a college in your territory. If a local program can be organized by you—two objectives are obviously being achieved:

1. Getting additional high school teachers interested and better equipped each year, and

2. Interesting the college itself in turning out more teachers and students who are focused on the engineering opportunity.

There is something for everybody to do. These things include:

- Developing programs for teachers and students to spend a day in your plants and for your people to return the call.
- Offering speakers to schools.
- Helping local schools and their students put on science fairs, math contests, and engineering day rallies.
- Supporting adequate math and science courses in schools and helping them to get adequate laboratory equipment.
- Lending your support and assistance to afford better guidance counselling in your communities.
- Helping to obtain adequate pay and status for math and science teachers.
- Informing teachers and students of teaching aids, etc, available locally and nationally.

EEI Elects Officers and Directors

Donald S. Kennedy, president, Oklahoma Gas & Electric Co, has succeeded Harllee Branch, Jr, president, Georgia Power Co, as president of Edison Electric Institute. J. Wesley McAfee, president, Union Electric Co, has replaced Kennedy as vice president.

Edwin Vennard, a vice president since April, has added the title of managing director held by Col H. S. Bennion before his retirement. A. B. Morgan was reelected secretary and assistant managing director, and H. S. Sutton, Consolidated Edison Co of N. Y., as treasurer.

Directors, who also were elected at the recent board meeting at Atlantic City, include:

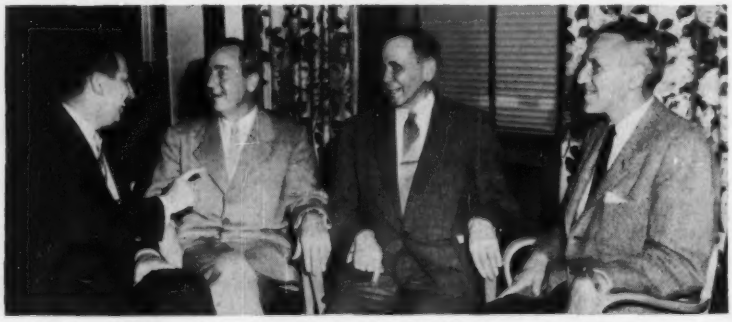
(Term Expiring 1957)

R. P. Briggs, Consumers Power Co

(Terms Expiring 1959)

H. J. Cadwell, Western Massachusetts Electric Co

Stuart Cooper, Delaware P&L Co



BRANCH VENNARD BENNION KENNEDY

Carl J. Forsberg, Wisconsin P&L Co

Allen S. King, Northern States Power Co

C. E. Kohlhepp, Jersey Central P&L Co

C. R. Landrigan, Detroit Edison Co

J. E. Loiseau, Public Service Co of Colorado

Earle J. Machold, Niagara Mohawk Power Corp

D. C. McKee, Empire District Electric Co

P. H. Powers, West Penn Power Co

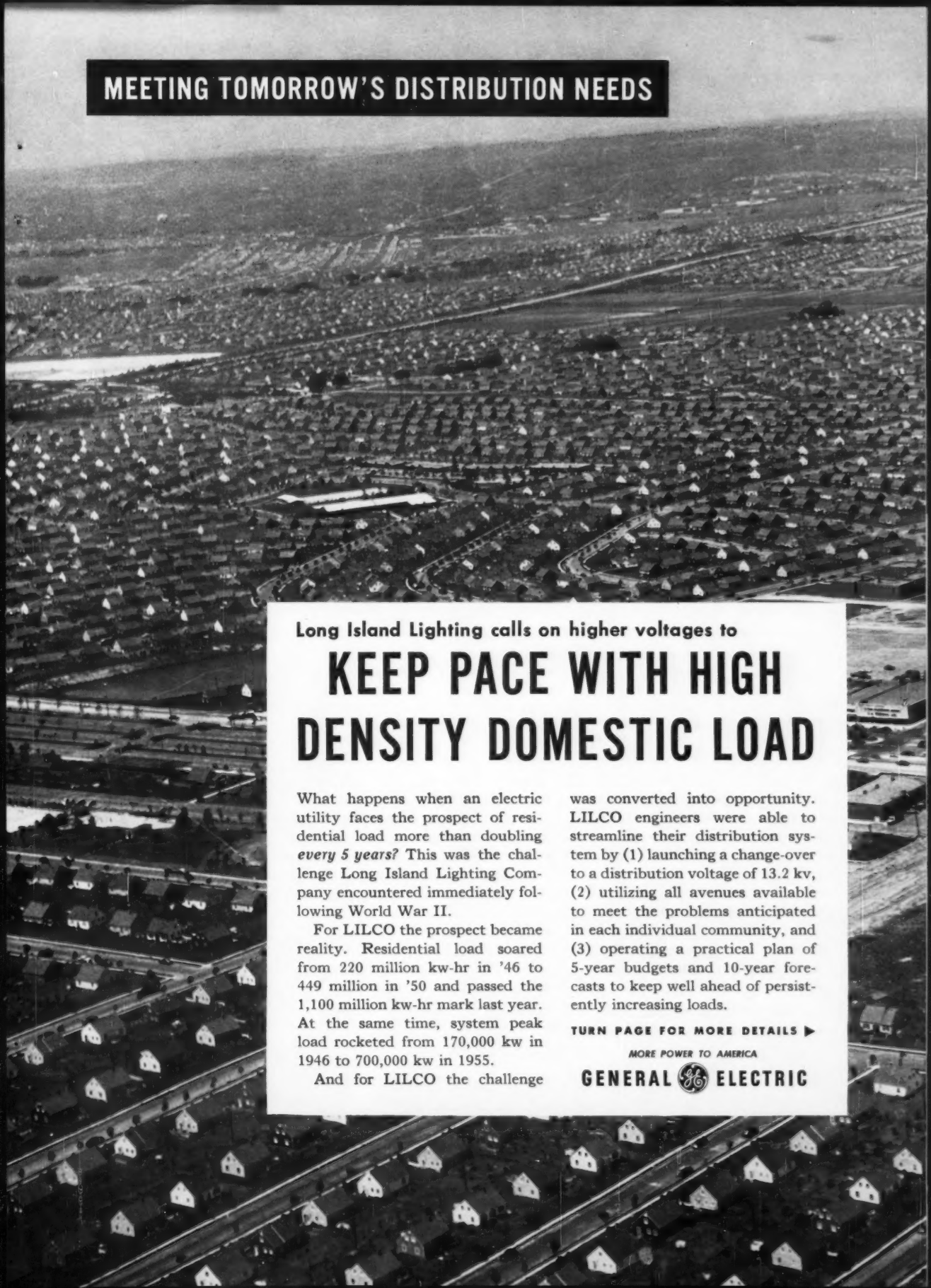
R. G. Rincliffe, Philadelphia Electric Co

R. E. Ritchie, Arkansas P&L Co

W. H. Sammis, Ohio Edison Co

J. R. Welsh, Southwestern G&E Co

Erwin H. Will, Virginia E&P Co



Long Island Lighting calls on higher voltages to

KEEP PACE WITH HIGH DENSITY DOMESTIC LOAD

What happens when an electric utility faces the prospect of residential load more than doubling *every 5 years?* This was the challenge Long Island Lighting Company encountered immediately following World War II.

For LILCO the prospect became reality. Residential load soared from 220 million kw-hr in '46 to 449 million in '50 and passed the 1,100 million kw-hr mark last year. At the same time, system peak load rocketed from 170,000 kw in 1946 to 700,000 kw in 1955.

And for LILCO the challenge was converted into opportunity. LILCO engineers were able to streamline their distribution system by (1) launching a change-over to a distribution voltage of 13.2 kv, (2) utilizing all avenues available to meet the problems anticipated in each individual community, and (3) operating a practical plan of 5-year budgets and 10-year forecasts to keep well ahead of persistently increasing loads.

TURN PAGE FOR MORE DETAILS ▶

MORE POWER TO AMERICA
GENERAL ELECTRIC

MEETING TOMORROW'S DISTRIBUTION NEEDS

LOW AND COMPACT design of G-E unit substation enabled LILCO to do attractive landscaping, keep local good will high, as discussed by W.O. Smith; F.G. Josberger, Distribution Engineer; C. Kiel, Jr., and R.M. Grogan.

Long Island

EXTRA FLEXIBILITY of G-E equipment is demonstrated by single-phase transformer with cabled secondary and services supplying residences. Streamlined design is explained by G.E.'s E. J. Bateman to Long Island Lighting's L. G. Colson and R. Hickson.

EXTENDED LIFE of G-E meters helps utilities cut maintenance costs. This bank of G-E meters in an apartment house holds attention of Long Island Lighting Company's G. R. Sullivan and W. A. Hickson, Jr.

MAXIMUM SERVICE CONTINUITY is assured by G-E distribution transformers. Above, W. O. Smith, Ass't. Vice Pres. & Mgr., Elec. Operating Dept.; C. Kiel, Jr., Ass't. Mgr., Elec. Oper. Dept.; and R. M. Grogan, Mgr., Meter and Distribution Engineering, all of LILCO, note clean arrangement of General Electric line transformer and triplex service. The secondary conductors shown here are aluminum.

MAGNETIC SUSPENSION and cyclometer register features in G-E I-55 meters are discussed by E. J. Bateman, G-E sales engineer, with LILCO's J. Dye (l), Superintendent—Meter & Test Section, and R. M. Grogan (r). New meter design assures straight-line accuracy to 100 amperes.

IMPROVED VOLTAGE CONDITIONS, helping systems carry more load, are two reasons for installing G-E capacitors. Above, G.E.'s M. Lennig (l) checks performance of 300-kvar G-E switch capacitor bank with LILCO's J. A. McDougall, and R. Hickson, Distribution Planning Engineer.

Lighting Co. activates long-range plans to expand distribution system capacity

Reliability of General Electric apparatus aids in boosting service continuity

The now-historic post-war home building boom on Long Island meant that larger and larger blocks of power would be needed. Even more important, this power must be made available at easily usable voltages for local distribution. Starting from there, Long Island Lighting engineers launched a program to raise transmission voltages from 66 to 138 kv and capitalized on the advantages of 13.2 kv for distribution. Result: during the record-breaking winter peak of 1955, more than 45 per cent of LILCO's total load was served economically and efficiently over the 13.2-kv lines.

To put such plans into action, LILCO decided to utilize the best equipment available. Much of this apparatus was selected from General Electric's complete line.

When you, like LILCO, specify G.E., you take advantage of the latest advances in apparatus design, construction and application. That's because G-E engineers are able to translate the trends and needs of growing systems as reported by G-E field personnel, incorporate newest materials and manufacturing techniques in producing them, and provide help in putting these advances to best possible use on your system.

And to help utilities keep service running smoothly, highly trained G-E service engineers plus a nation-wide network of G-E Service Shops stand ready to meet any and all maintenance and repair needs—day and night.

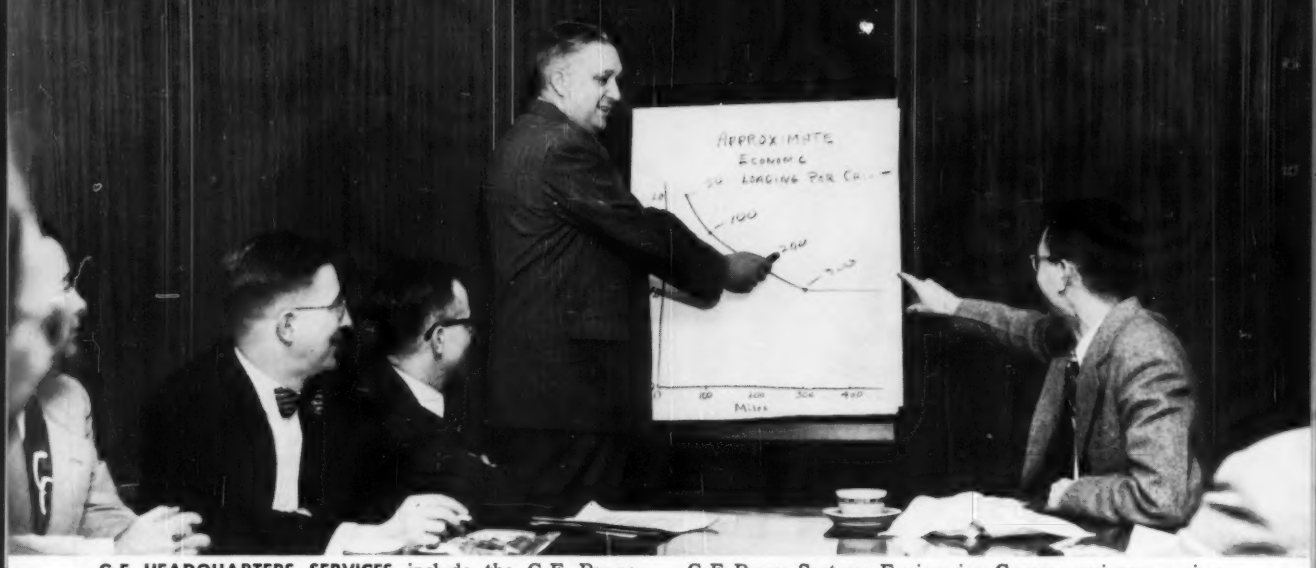
For full information on General Electric distribution equipment and distribution system services, contact your nearby G-E Apparatus Sales Representative, authorized G-E Agent, or G-E equipment distributor today. Or write General Electric Company, Section 303-1, Schenectady 5, N. Y.

TURN PAGE FOR MORE ON MEETING TOMORROW'S DISTRIBUTION NEEDS ▶

MORE POWER TO AMERICA

GENERAL ELECTRIC

MEETING TOMORROW'S DISTRIBUTION NEEDS



G-E HEADQUARTERS SERVICES include the G-E Power Systems Engineering Course, the Electric Utility Systems and Practices Course, and board studies. Above, at the G-E Power Systems Engineering Course, engineers review basic approaches to system designs that will help step up system efficiency, improve consistency of service.

G-E Power Systems Engineering Course helps utilities plan for future with sound ideas

Part of General Electric's continuing program to assist electric utilities in meeting today's growing demands for electric power is the G-E Power Systems Engineering Course. In this course, promising young utility personnel are given the opportunity to study advanced electric utility system theory and practice. As a result, utilities are able to train men to incorporate latest ideas into system designs.

The full range of G.E.'s distribution system services includes headquarters system planners—district application and product engineers—extensive product development facilities—equipment installation and field service engineering—complete interflow of ideas. To the electric utility industry, these services offer assurance of maximum operating continuity, on-the-spot application help, greater equipment efficiencies, valuable help in system design and techniques.

Get the full story from your G-E Apparatus Sales Representative. General Electric Company, Schenectady 5, N. Y.

MORE POWER TO AMERICA

GENERAL ELECTRIC

More Reasons Why It Pays to See G.E. About Distribution Problems

LOCAL APPLICATION ENGINEERS assist utility engineers with system designs, equipment-type selection, application problems early. Answers speed practical use of latest ideas, product advances.

GREATER EQUIPMENT RELIABILITY comes from tireless product development and research. Here flame-retardant, self-extinguishing insulation for G-E metal-clad switchgear gets appraisal before use.

APPLICATION OF ADVANCED IDEAS is assured by district electric utility application engineers. At forums held by General Electric, these engineers study the latest answers to field problems.

INSIDE of the hopper shows collecting end of the sampling pipe. White arrow indicated the air cylinder above chute

OUTSIDE of the hopper, the sampling pipe discharges into sample collecting can. The timer-pilot valve is at the right

GENERATION—Testing

Homemade Sampler Takes Coal on Conveyor

A. GLENN HARTER, Instrument Foreman, Essex Generating Station, Public Service Electric & Gas of New Jersey, Newark, N. J.

A homemade coal sampling device, designed to eliminate the human element in obtaining periodic cross-sections of coal discharged from a moving conveyor belt, is used at the Essex and Kearny generating stations of Public Service Electric & Gas Co in New Jersey. Crushing, coning, and quartering of the coal can be done manually in a few minutes. Incorporating these intricate mechanical operations with the sampler would have invited higher maintenance costs. The sampler has required no maintenance in two years of operation.

The device's parts are:

1. An electric timer, energized by the conveyor control circuit, which actuates

2. A solenoid air pilot valve supplying 40-psi air to operate

3. An air cylinder which raises and lowers into the coal stream

4. A sample collecting pipe pivoted on the outer wall of the transfer hopper. When raised the hopper chutes collected coal into

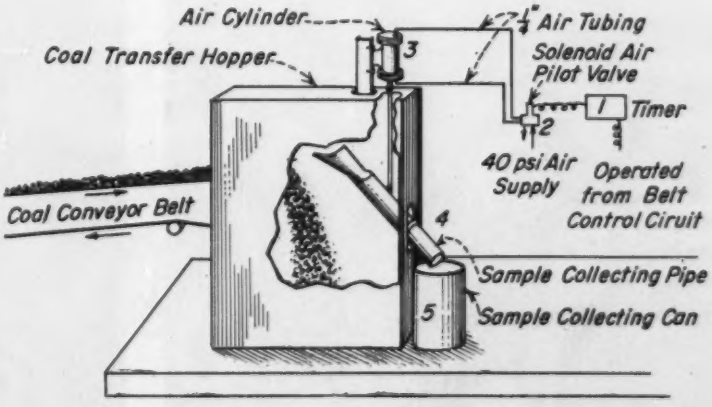
5. A sample collecting can outside the hopper.

The 6-in. sample collecting pipe is pivoted in a hanger clamp with short, ⅝-in. dia stub shafts welded to it. The stub shafts are set in pillow block bearings bolted to the outer wall of the hopper on either side of the eliptical hole for the pipe. A flat steel connector is pinned to the clevis on the rod of the piston above the hopper. The other end of the connector is pinned to the clevis atop the section of 6-in. pipe within the hopper.

When the piston is down, the sampling pipe is horizontal; when up, the sampling pipe is 60 deg from horizontal. The collecting end of the pipe is flared so that in the horizonal position the sample is taken completely across the coal stream.

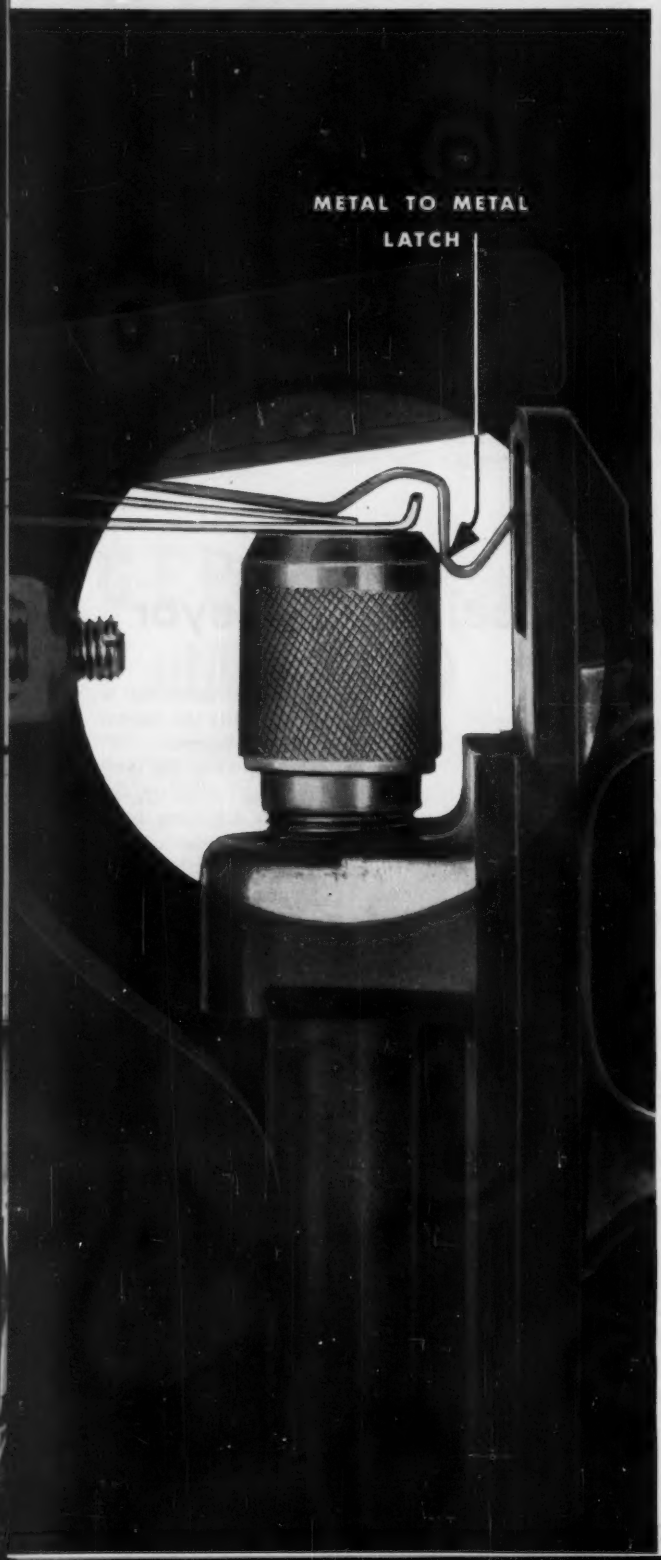
The timer is in the conveyor con-

(*Continued on page* 134)



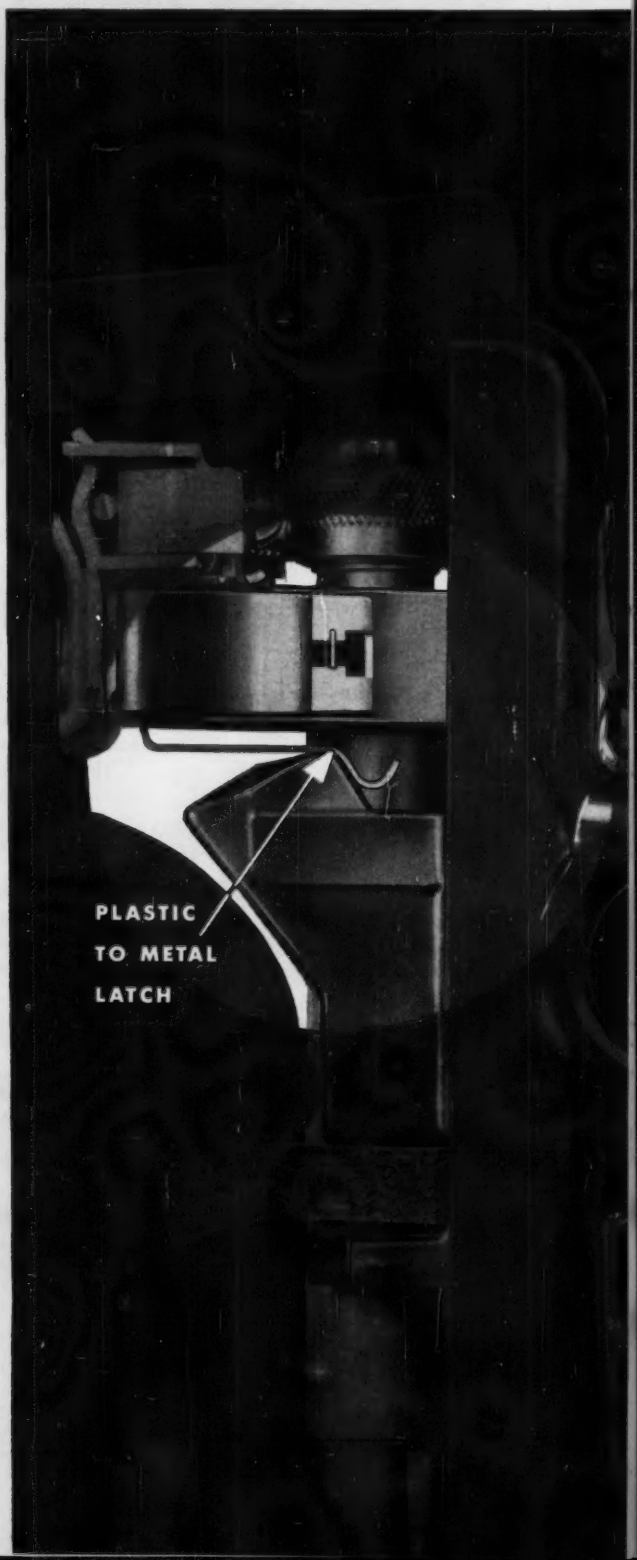
old

Metal-to-metal latching sometimes "seizes" under corrosive conditions. Door may be hard to open.



new

Plastic-to-metal latching eliminates door "seizing" problem. Door opens quicker, easier.



ALL-NEW ENCLOSED FUSE CUTOUTS

now...

Plastic-to-metal door latch assures easier opening prevents door "seizing"

Even after years of service, the doors on all-new G-E enclosed fuse cutouts open easier. Unique plastic-to-metal latching prevents corrosive "seizing" common to metal-to-metal latches. Easier door-opening is assured for drop-out action, switchstick handling, and manual operation.

POSITIVE LATCHING is assured throughout the life of the cutout by latching members of sturdy Textolite* material and long-life stainless steel. Current-carrying parts and latching members are functionally separated and are not required to perform a double duty.

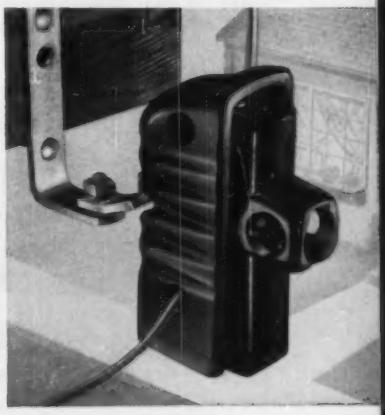
ALL FUNCTIONS IN ONE basic design—G.E.'s new enclosed fuse cutout line gives all functions . . . indicating-dropout, indicating-non-dropout, disconnect—in one basic design. You get two current ratings, 50 and 100 amperes, and two voltage ratings, 5.2 and 7.8 kv, to match every possible system demand.

OTHER OUTSTANDING FEATURES include: the safety-grip door handle, for easier door handling; self-aligning "V"-wedge contacts, that add years to cutout life, and compression-clamped hanger supports, that withstand the roughest shocks. For a complete description of the new cutout line, write for bulletin GEA-6208, General Electric Company, Sec. 433-15, Schenectady 5, N. Y.

*Registered Trademark General Electric Co.

ENGINEERS AND LINEMEN AGREE

The completely new line of G-E fuse cutouts has more of the features they prefer. There's good reason, too—the new design incorporates suggestions made by utility engineers and linemen to G-E sales engineers and specialists.



Progress Is Our Most Important Product

GENERAL ELECTRIC

Sample—Homemade

(*Continued from page* 131)

trol circuit. For every 20 min of belt operation, the four-way solenoid air valve is energized for 1 min. During the minute air is admitted to the top of the piston to lower the pipe into a horizontal position, putting the flared end in the stream. The sample is collected immediately, excess coal flowing over it. At the minute's end air is admitted to the bottom of the piston and the pipe is raised to a 60-deg angle chuting the collected coal through the pipe into the can.

Sample quantity is varied by changing the size of the flare or the cams in the timer for other than 20-min intervals. A 4-cu-ft can obtains a 200-lb gross sample from the 2,000 ton barges received. Ideal position of the sampler is after the crusher or breaker.

TODAY'S DESIGN TRENDS

10-in. Insulator Has 36,000-lb M&E Strength

Ten-inch ball-and-socket suspension insulators said to develop 36,000-lb mechanical and electrical strength by use of a different ceramic body have been introduced by General Electric Co's Insulator Department. This design grew out of customer requests for an ultra-high-strength insulator within the 5¾-in. spacing commonly provided for suspension units.

Except for modifications of the cap to strengthen the socket and enlargement of the ball and pin shank, the new unit closely resembles GE's version of EEI-NEMA Class 52-5 which carries a 25,000-lb M&E rating. It is 2 in. less in diameter and 35% lighter than their 52-7, a clevis-type unit carrying a comparable 36,000-lb rating.

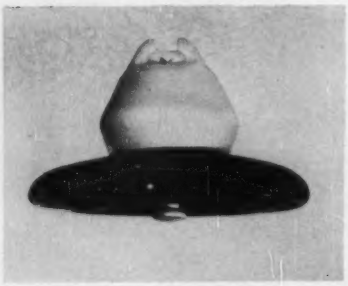
The new insulators are designed for large EHV transmission conductors with breaking strength upwards of 31,000 lb, it is stated. Each conductor can be terminated on a single string of 36,000-lb insulators when conditions warrant instead of double-string assemblies of 25,000-lb ball-and-socket units. This is considered particularly advantageous for bundled conductors, the makers report.

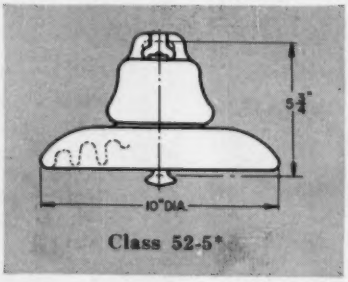
Cost of the insulators is slightly less than for double strings. Elimination of yokes and associated hardware are said to facilitate installation and hot-stick maintenance.

Key to this development is the ceramic body. In the 36,000-lb unit it provides electrical characteristics identical with those of the present 25,000-lb standard unit. But its impact strength is 100 in.lb compared with 60 in-lb for GE's 52-5, and 50 in.lb for 52-7. The manufacturer claims that this body will be applicable to produce higher M&E strength in other insulators.

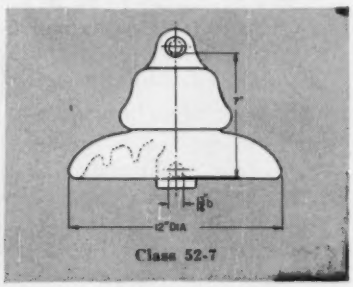
UHS Insulator Gives 52-7 Strength in 52-5 Size

	New UHS Unit	EEI-NEMA Class 52-7	EEI-NEMA Class 52-5
M&E strength, lb	36,000	36,000	25,000
Diameter, in.	10	12	10
Unit spacing, in.	5¾	7	5¾
Unit weight, lb	15½	25	15
Leakage distance, in. per in. spacing	1.91	1.78	1.91
Impact strength, in. lb	100	50	60





Class 52-5



Class 52-7

METERING—Testing

Portable Phase Shifter Affords Easy Testing

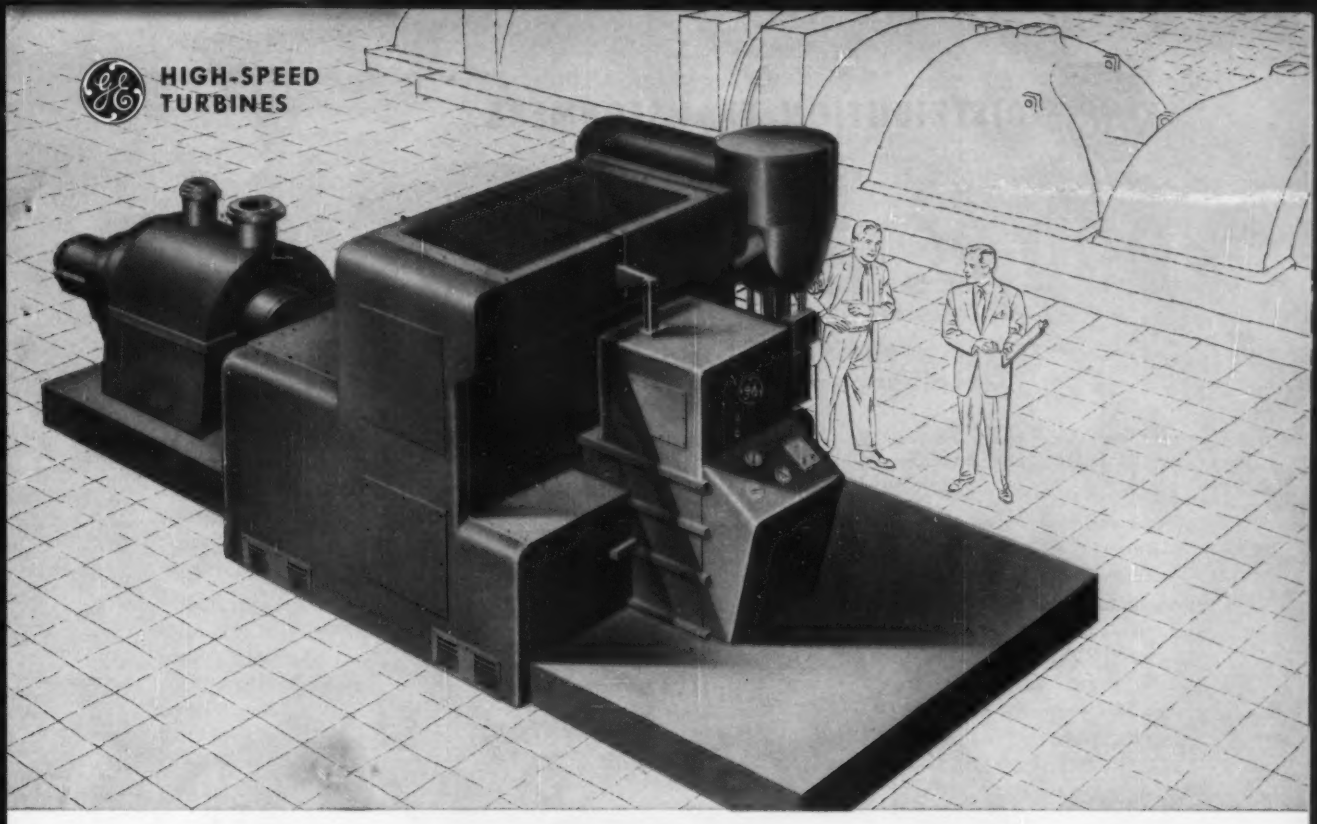
D. E. BANNISTER, Relay Inspector, New England Power Service Co, Worcester, Mass

A 120-v, 3-phase potential phase shifter, embodying features recommending it for relay as well as field testing, has been assembled by the New England Power Service Co. Its advantages include light weight, portability, stability, quietness of operation, and low cost.

The phase shifter's components are a variable autotransformer and a nonshorting, 4-section, 6-position rotary switch. The material list is completed by a case, studs, and such miscellaneous items as can be found in any relay or meter shop.

The variable autotransformer is

(*Continued on page* 138)



With G.E.'s new turbine drives for boiler feed pumps . . .

Up to 40% of auxiliary electrical power can now be released as salable kilowatts

In today's larger-capacity, high-pressure steam stations, motor drives for boiler feed pumps require as much as 10,000 hp—a heavy drain of auxiliary electrical power. To release this power as salable kilowatts, General Electric now offers a new line of high-speed turbines—specifically designed for 4000 to 10,000 hp boiler feed pump service.

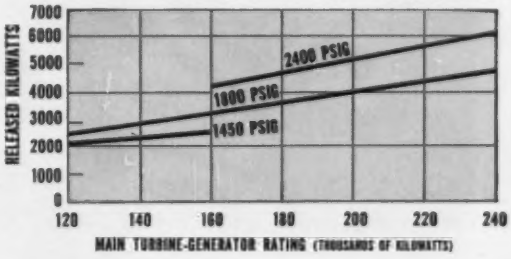
Savings in auxiliary electrical power can be as high as 40% with the application of these G-E turbines. Auxiliary system voltage can often be reduced from 4160 to 2400 volts, with considerable savings through lower transformer and circuit breaker ratings.

G-E turbines provide direct drives at speeds up to 9000 rpm. At half load or above, the variable-speed turbines can also improve net station heat rate by eliminating transmission losses and throttling losses across feed valves.

Over the past 25 years several utilities have operated G-E turbines in boiler feed applications. More recently, the development of economical high-speed pumps for large-capacity boiler feed service has broadened the range of applications for turbine drives.

If you are now contemplating system capacity increases of 100,000 kw or more, be sure to ask your Apparatus Sales Representative about G-E High-speed Turbines for boiler feed applications. Or write to General Electric Company, Section 241-6, Fitchburg, Mass.

Kilowatts released using G-E turbines for feed pump drives



Progress Is Our Most Important Product

GENERAL ELECTRIC

DISTRIBUTION TRANSFORMERS

THIS BOLT

COULD SAVE YOU...$3,000

Estimate your possible savings in terms of all transformers on your lines

When the neutral terminal on a 25-kva transformer broke, it put 240 volts across the 120-volt lines of several customers of a Northwestern utility. Result? Nine irate customers sued the utility for about $3000 worth of ruined household appliances.

This was an unusual situation, of course. But ordinary terminals sometimes crack, and the results can be serious. The usual villain is stress-corrosion, initiated when a lineman tightens the terminal clamp close to the metal's yield point. Corrosive elements go to work and eventually the terminal clamp breaks, dropping the line and bringing customer complaints.

G-E Strenicor terminal clamps can save you that expense. Designed to be 100% resistant to stress-corrosion, the clamps are practically immune to failure. Forged from a new copper-nickel-silicon alloy—Strenicor—G-E clamps have a tensile strength of 107,000 psi, and will resist corrosive atmospheres that cause failure in ordinary copper alloys.

Look at the other money-saving features that prove "all transformers are not alike": **Impulse testing,** for instance, saves years of transformer life. **One-piece clamping bands** save maintenance time. Reusable Nitrile rubber gaskets help save units from contamination. **AL/CU terminals** are designed to prevent both copper and aluminum conductors from loosening. **Super Melaglyp paint** saves up to two repaintings. **Nationwide warehouses** save utilities heavy inventory expense. **Service shops** can cut your repair and rebuilding costs.

For the complete story, contact your nearest G-E Apparatus Sales Office or G-E Agent—or write to General Electric Company, Section 431-37, Schenectady 5, N. Y.

dollar-saving features prove ATANA*

***ALL TRANSFORMERS ARE NOT ALIKE**
(make this simple comparison and see)

FEATURE	General Electric	Mfr. A	Mfr. B	Mfr. C	Mfr. D	Mfr. E
Production-line impulse testing	√			√		√
Nitrile rubber gaskets	√					√
One-piece clamping band	√					
H-v and l-v terminals handle both copper and aluminum conductors	√					
Strenicor pressure terminal clamps	√					
Super Melaglyp paint	√					
More than 100 warehouses	√	√				
Nationwide, company-operated service shops	√	√				

Progress Is Our Most Important Product

GENERAL ELECTRIC

Phase Shifter Portable

(*Continued from page* 134)

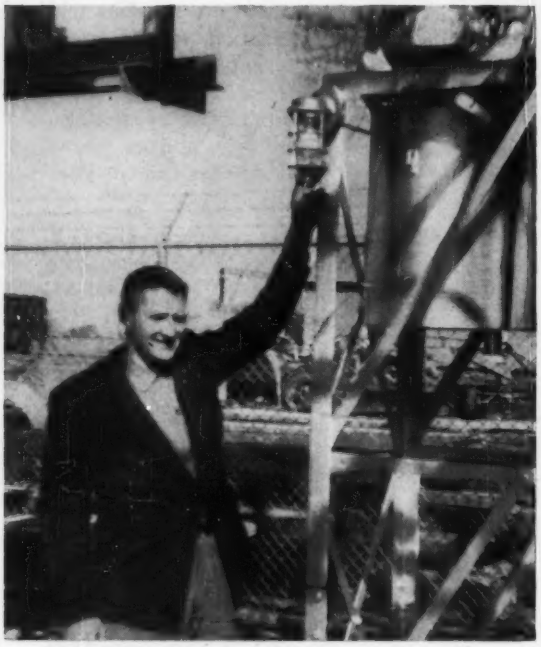
POTENTIAL (E) 1-2 can be shifted from in-phase with (E) a-c to in-phase with (E) b-c, i.e. 60 deg

connected across two phases of a 120-v, 3-phase source, and the potential is taken between the sliding contact and the third phase. Thus, by shifting the sliding contact from one end of the autotransformer winding to the other, the potential is shifted 60 deg. Using the 60-deg shift and all combinations of a, b, and c, the potential is rotated through 180 deg. The output voltage varies from 120 to 104 v, plus or minus, during the shift, but may be corrected by a second variable autotransformer.

Current leads are permanently attached to the source terminals, so that the current is fixed in relation to the potential output. The 3-amp variable autotransformer and miniature rotary switch are adequate.

The whole equipment is housed in an old indicating meter case whose dimensions are 7 x 7 x 5½ in. The controls for the variable autotransformer and rotary switch extend through the cover. The three binding posts for the source are on the side. A moderately heavy 2-wire cable with a male plug is permanently attached to the source terminals to supply current to the test table. A female recepticle set into the case supplies shifted potential to the test table.

Current and potential outlets can be polarized. The autotransformer is calibrated for three scales, 0-60, 60-120, and 120-180 deg. The rotary switch is marked to indicate in which of the six areas of potential shift the autotransformer will operate.



SUBSTATIONS—Operation

Indicating Light Saves Time During Outage

THOMAS HILL, Residential Salesman, Idaho Power Co, Mountain Home, Idaho

An indicating light on a 12-kv oil switch installation provides an instant and positive indication of the switch position during pole-top switching following an outage. It is estimated that the light saves from 4½ to 6 min of outage time for about 1,000 customers served by the 12-kv feeder.

At the Mountain Home substation of Idaho Power Co, a feeder leaves the substation as one circuit and splits outside the fence at pole-top switches into two feeders. Previously when sectionalizing during an outage, the lineman had to return to the substation building to determine the position of the oil switch. This took from 12 to 17 min as entered into switching reports.

The indicating light is mounted on the oil switch so that it can be seen from the pole-top position. It is actuated by a 24-v dc relay operating off the switch contacts. Now the lineman can determine if the switch held without leaving the pole.

GENERATION—Maintenance

Portable Boring Bar Does Many Power Plant Jobs

D. E. BANNISTER, Relay Inspector, New England Power Service Power & Light Co, Indianapolis, Ind.

Many refacing and reseating jobs around the power plant have been made easier by a small portable boring bar, built initially by the crew of Indianapolis Power & Light Co's Perry "K" plant for refacing a leaking valve bonnet flange in the line. The flange was on a 12-in. cast steel valve.

The boring bar consists of a base plate, a collar, a threaded bushing for feeding, and a spindle equipped with a thrust bearing at each end of the bushing. The spindle is driven by an air motor.

(*More How To on page* 146)

NEW DELTA-STAR PMB-40

Braidless Single Side-Break Switch develops high pressure contacts with exceptional ease of operation

★ PMB-40 Switch operates with exceptional ease—with high pressure swivel joint and low-friction swivel terminals. High-pressure joint is directly on the center line of the rotating terminal.
★ Entering or withdrawing the blade from high-pressure contacts is smooth and easy—with toggle and knee-break action.
★ Factory sealed stainless steel ball bearings on rotating insulator require no lubrication for the life of the switch.

PMB-40 Single Side-Break Switch blade contacts are patterned after Delta-Star's famous MK-40 vertical break switch. They feature hard drawn copper contact shoes with silver inlays. Non-current-carrying beryllium copper leaf springs apply pressure; large deflections assure maximum contact pressure over years of wear.

The PMB-40 Side-Break Switch is available in voltage ratings from 7.2 kv to 161 kv and current ratings from 400 to 1200 amperes.

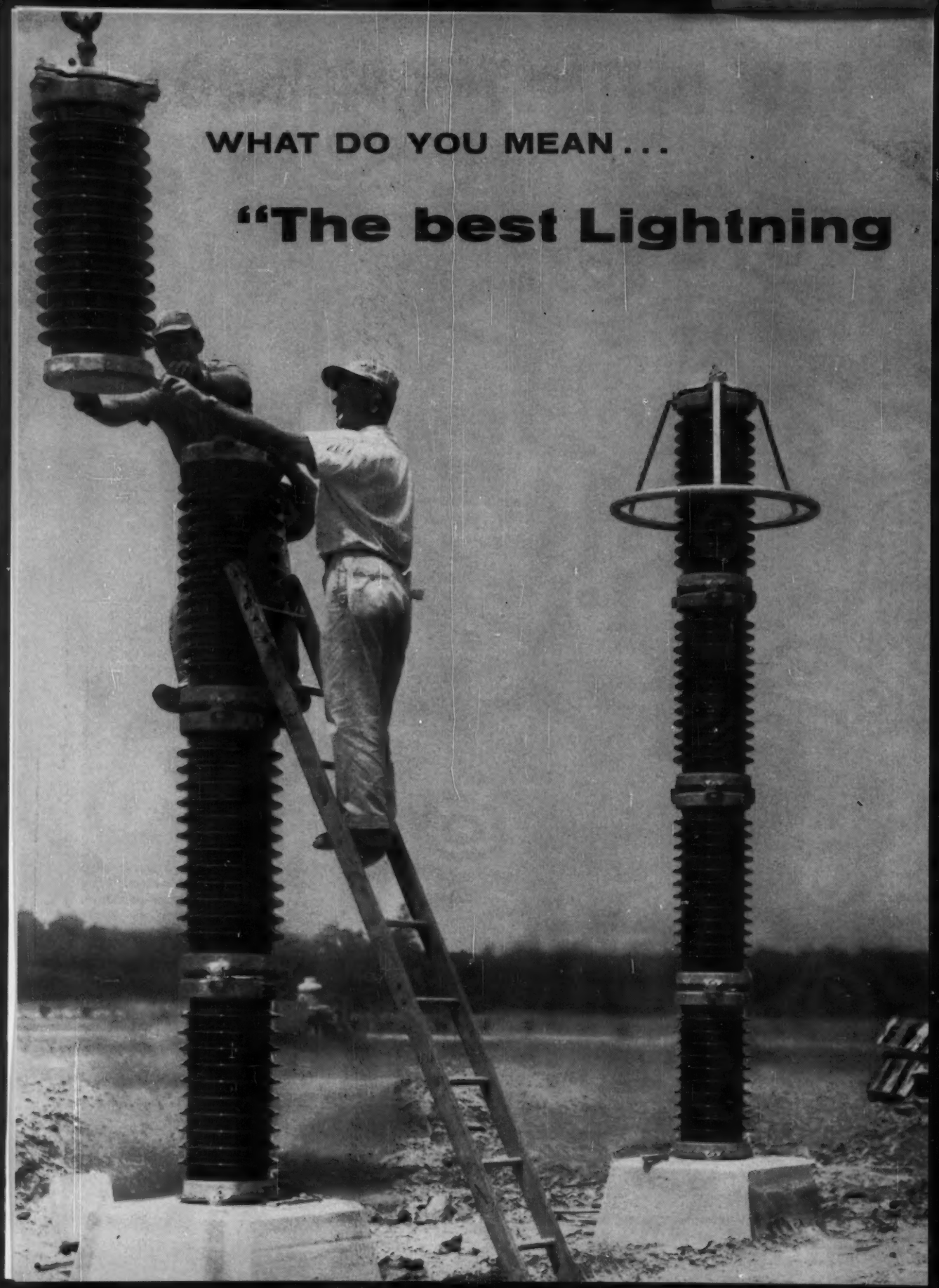
Write for PMB-40 Publication No. 5604—or see your Delta-Star representative.

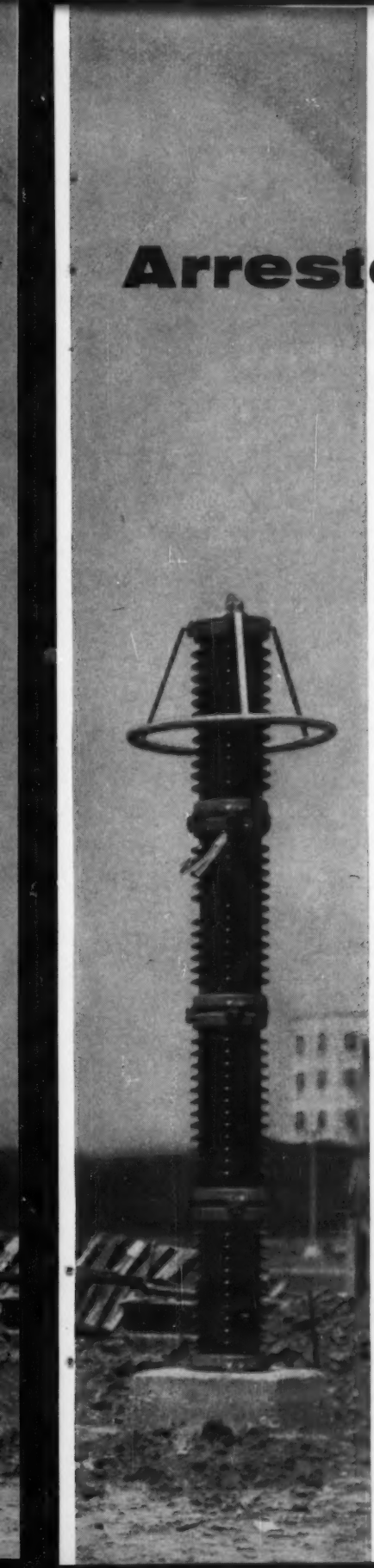
HKP — A DIVISION OF H. K. PORTER COMPANY, INC.

DELTA-STAR ELECTRIC DIVISION

H. K. PORTER COMPANY, INC.

2437 Fulton Street · Chicago 12, Illinois · District offices in principal cities


WHAT DO YOU MEAN . . .
"The best Lightning



Arrester for half price!"

For high transmission voltages, Thorex MPR lightning arresters meet or exceed all present-day, top grade protective requirements, and include two very important extras:

(1) Internal grading provisions that protect the sensitive action of the arrester from the effect of conductive surface contamination that has, at times, been destructive to such devices *not* so-protected.

(2) Complete self-support at all transmission voltages, even those above 300 kv.

Let us talk about Point No. 2, for here is where dollars enter the picture.

Design, fabrication and construction of heavy, complicated steelwork and foundations to brace or suspend several tons of lightning arrester is a costly extra -- and an unnecessary extra! It may total up to as much or more than the arrester, itself. It thus can double the installed price.

This premium in cost, moreover, provides absolutely no premium in protection. It may even carry with it less protection through a necessity for greater separation distance between equipment and its associated arrester. In fact, the Thorex with all its practical economies, gives you a fuller protection package. The performance premium is on the side of the dollar bargain. You get *both* with Thorex.

Put your own value on the simple, and exclusive, feature of self-support possessed by all Thorex arresters. Add to this the fact that Thorex is a superior protective device. Then make the obvious sound choice.

- - - - we will be seeing you.

OHIO BRASS COMPANY, MANSFIELD, OHIO

TECHNICAL COMPETENCE the heart of every Ohio Brass arrester

4631-H

Determine Watt-Feet for Multiple Street Lights

Chart provides watt-footages for five ratings of incandescent lamps. It eliminates need for converting lumens to watts. Relays and transformers may be spaced without repeated calculations of watt-feet.

HUEY P. SYKES, Estimator, Engineering Dept., Humboldt Division, Pacific Gas & Electric Co, Eureka, Calif.

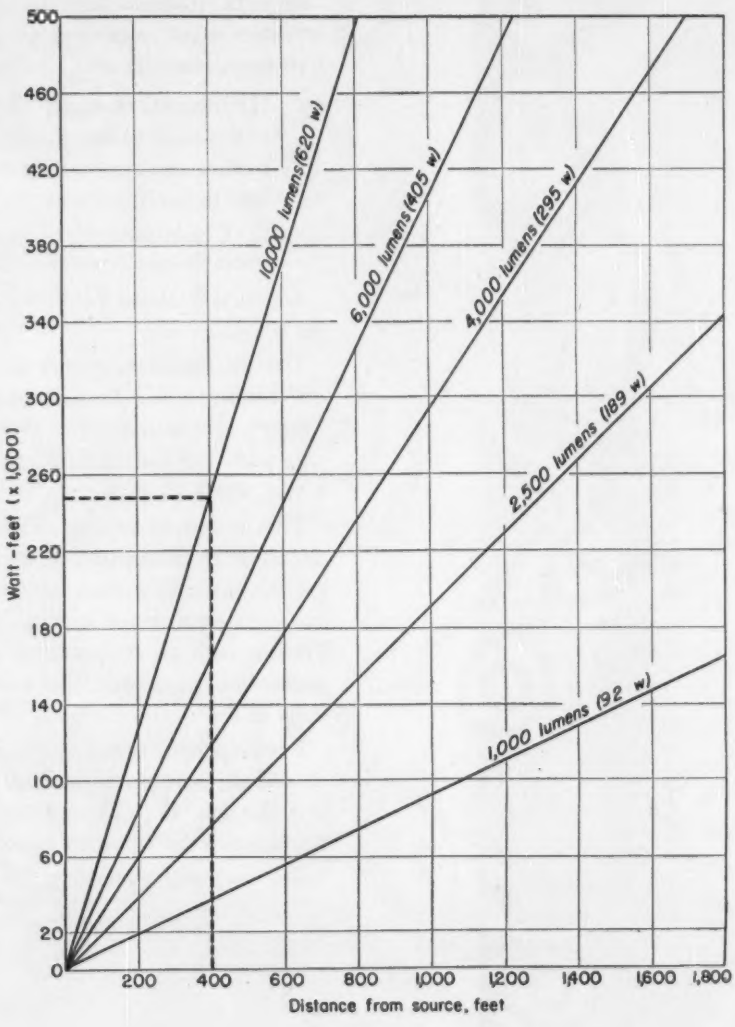
Accompanying chart is an aid in determining watt-feet for multiple incandescent street light installations.

Limit Voltage Drop

In the design of such installations, it is considered economical to limit voltage drop in the circuit to 3%. Because lamp size and circuit length can be determined readily, it is convenient to express voltage drop in terms of watt-feet. For example, a single 400-w lamp served over 1,250 ft of No. 6 copper conductor will cause a voltage drop of about 3%. Thus 500,000 (400 x 1250) watt-feet will be the practical limit for No. 6 copper conductor.

Saves Computations

When several street lights are involved, it is often necessary to compute watt-feet for each lamp a number of times to insure that relays and transformers are placed in the most economical locations. Generally, the lumen rating, but not the wattage, of the lamp is known. It then becomes necessary to convert lumens to watts and then make computations for watt-feet. Use of the accompanying chart eliminates the need for both the conversion from lumens to watts and the large number of calculations of watt-feet.

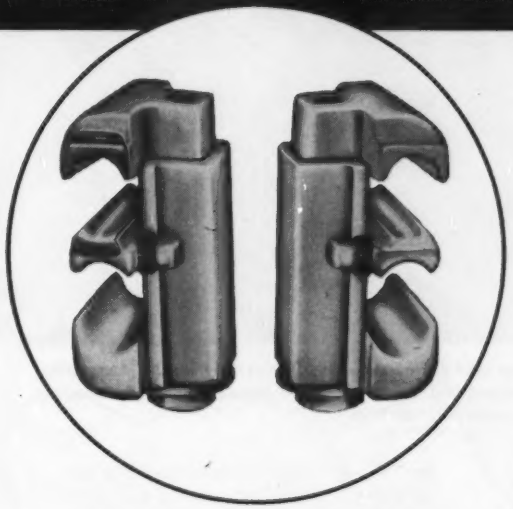


How to Use the Chart

A 10,000-lumen lamp is to be installed 400 ft from a transformer. On the distance scale, follow the 400-ft line to the intersection of the 10,000-lumen line. Read the answer on the watt-feet scale, 248,000 watt-feet.

...EVEN HOT...

"One Piece" FARGO CONNECTORS ARE EASY TO INSTALL



FARGO'S "9000 SERIES" FOR MAXIMUM PERFORMANCE IN SERVICE

Fargo's aluminum-bodied connectors have extra wide contact areas to overcome the high resistance of surface oxides and minimize cold flow. Larger mass gives additional radiating surfaces to hold the connector temperature under that of the conductors even under high fault currents. Well rounded corners and parabolic jaws minimize conductor damage due to physical distortion or nicking.

The soft pure aluminum spacer bar forms around the conductor excluding moisture and is a low resistance path between conductors . . . wide separation of the conductors minimizes the possibility of an electrolyte bridging the gap between the dissimilar metals.

The natural resilience of the connector body plus Fargo's exclusive vibration proof design maintains more than adequate pressure after repeated cycling. Fargo "9000 Series" connectors are available up to 397,500 ACSR.

Ask your Line Material Field Engineer for complete details.

RUBBER GROMMETS HOLD SPACER IN POSITION FOR EASE OF INSTALLATION

For hot work Fargo's "9000 Series" aluminum bodied vise type connectors are available with soft flexible grommets which hold the spacer bar in an open position so the run and tap conductors may be installed with ease. The grommets are out of the current paths between the conductors and do not interfere with the smooth easy operation of the clamp.

It is the easiest spacer bar clamp to install because it is "one piece" . . . no extra parts to assemble or threads to engage. Both hands are free to operate the hot stick.

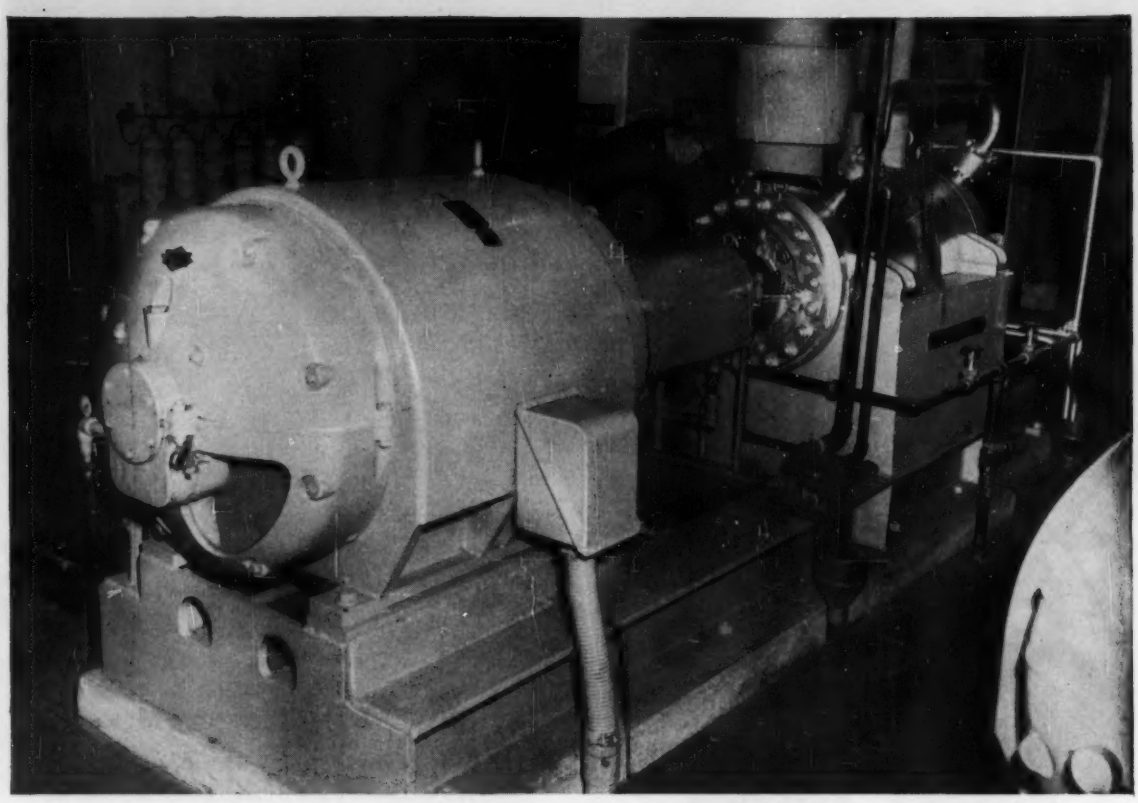
Tool #72 courtesy of Safety Live Line Tool Company, Oakland, California. Others are available.

FARGO

Manufactured by
FARGO MFG. COMPANY, INC.
Poughkeepsie, N.Y.

Distributed by
LINE MATERIAL COMPANY
(A McGraw Electric Company Division)
Milwaukee, Wisconsin

LM



"Here is a 1000 hp, 3600 rpm E-M Induction Motor," says Pete Powerhouse, E-M auxiliary drive specialist, "driving a feedwater pump for a large utility. This motor can take it. We use Kolene-processed bearings, the most rugged and dependable type you can specify for tough 2-pole motor service."

Pete Powerhouse says...

"Dependable Service

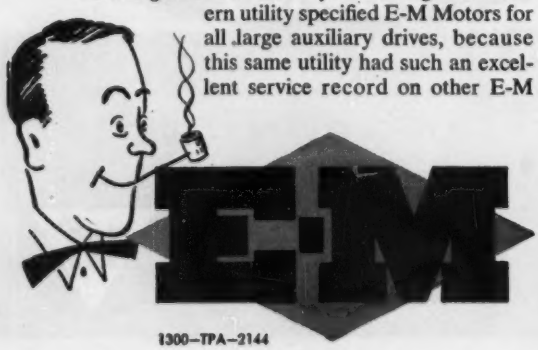
SOLD THESE POWER PLANT MOTORS"

● "I'm Pete Powerhouse, E-M auxiliary drive specialist. My business is motors in the powerhouse class, extra rugged for the gruelling demands of utility operations.

"I was glad to see recently that a large midwestern utility specified E-M Motors for all large auxiliary drives, because this same utility had such an excellent service record on other E-M Motors in their various plants.

"We consider extra dependability like this a trademark of E-M Motors. We at E-M have over 40 years of experience in intensive design and careful construction of large motors.

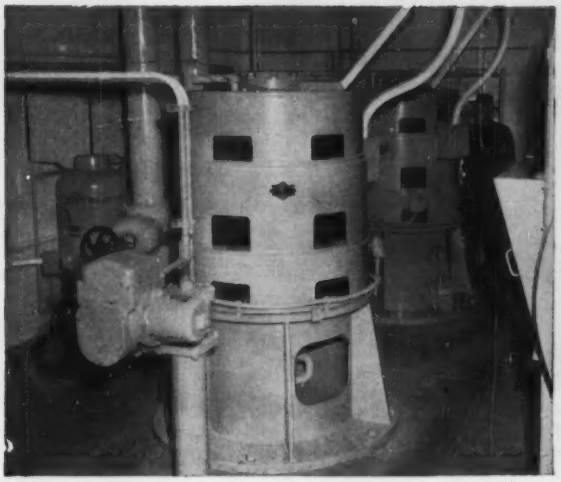
"Are you considering auxiliary drives? Ask your nearest E-M sales engineer for data, or write us at the factory for E-M Publications 189 and 214. They talk about auxiliary drive motors in detail."

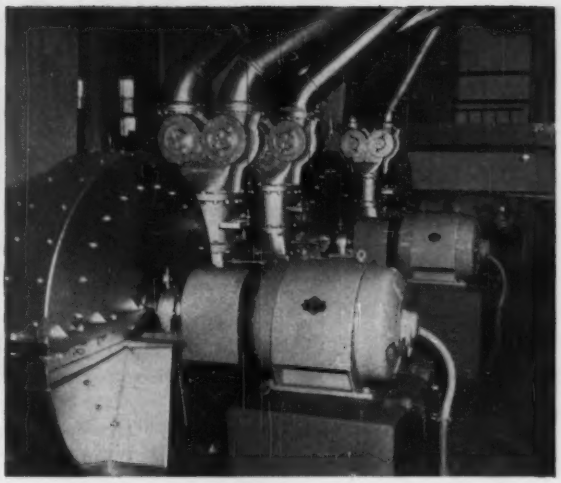


1300—TPA—2144

ELECTRIC MACHINERY MFG. COMPANY
Minneapolis 13, Minnesota

Specialists in making motors do
EXACTLY WHAT YOU WANT THEM TO



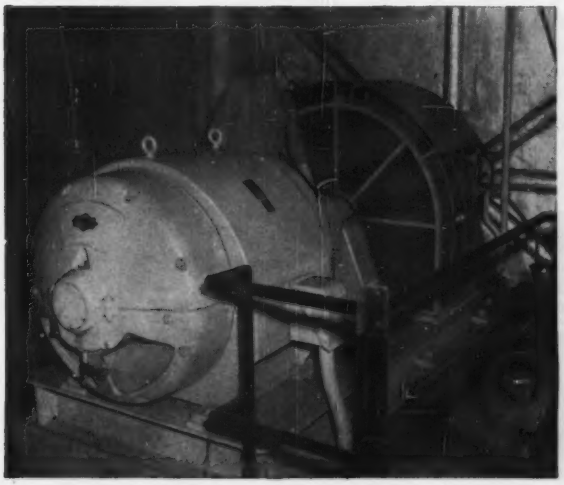


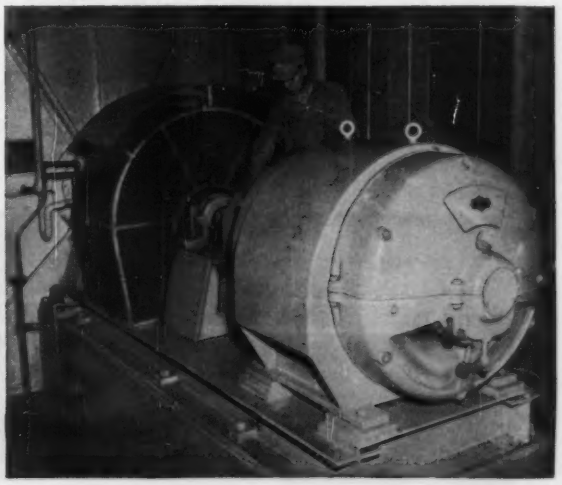
"Pete Powerhouse again. Here are two 150 hp, 495 rpm E-M Induction Motors driving vertical circulating pumps for this utility. Sectionalized frame construction of our Vertical Motors lets you get at core, coils, rotor and bearings in four easy steps. Routine care and maintenance is quick and convenient."

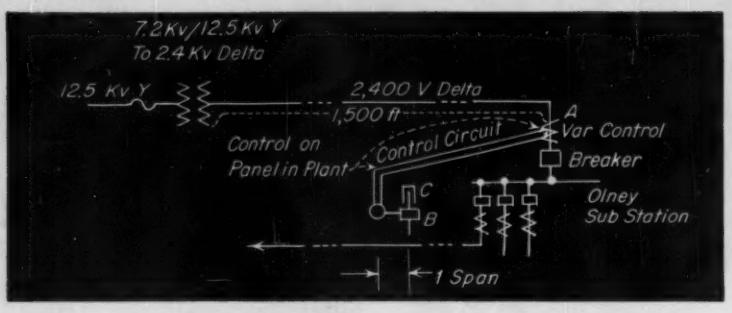
"These three coal pulverizers are driven by three 250 hp, 900 rpm E-M Induction Motors. Extra protection against moisture penetration, high humidity, fumes and harmful dusts is a must on these important drives. We use "Powerhouse" Insulation Treatment to give this vital protection."

"Here's a combination that's hard to beat for driving induced draft fans . . . a 700 hp, 885 rpm E-M Induction Motor and an adjustable-speed E-M Magnetic Drive. Heavy steel E-M Motor frames and enclosures are extra rigid, and pleasing in appearance, with no excessive weight."

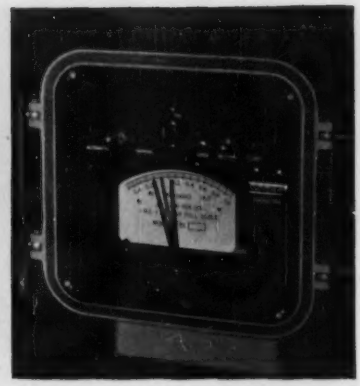
"One more to show you. This forced draft fan is driven by a 450 hp, 1180 rpm E-M Induction Motor with an E-M Magnetic Drive to adjust speed. E-M cage construction is practically indestructible. And rugged E-M rotors are balanced precisely for vibration-free operation!"







CAPACITORS provide maximum benefits at minimum cost. Var control, A, on main circuit operates breaker, B, to switch capacitors, C. Arrangement provides control of all vars on main circuit and permits light-duty breaker switching



VAR CONTROL EQUIPMENT was combined with CT's already installed in substation to control the capacitors.

Capacitor Arrangement Cuts Breaker Costs

An installation of capacitors at the Olney, Tex, substation of the Community Public Service Co is controlled by vars on the circuit, with a circuit arrangement that gives minimum cost. Purpose of the installation is to relieve the substation of var load.

Installing the capacitors on the feeder carrying the heaviest load instead of on the main circuit, made possible the use of a pole-type oil circuit recloser designed for switching capacitors. The installation is only three spans from the point at which the three feeders branch off.

Current transformers already installed in the substation were used with var-control equipment to meter the entire bus. A control circuit extends from the var control equipment to the pole-type oil circuit recloser that switches the capacitors on or off the system.

With this arrangement, capacitor switching is controlled by the vars on the entire circuit. Yet, the capacitors are on the branch circuit where the lighter-duty, lower-cost breaker can be used. The location also provides some voltage boost and helps transformer regulation.

GENERATION—Operation

Spud Aids Clinker Removal

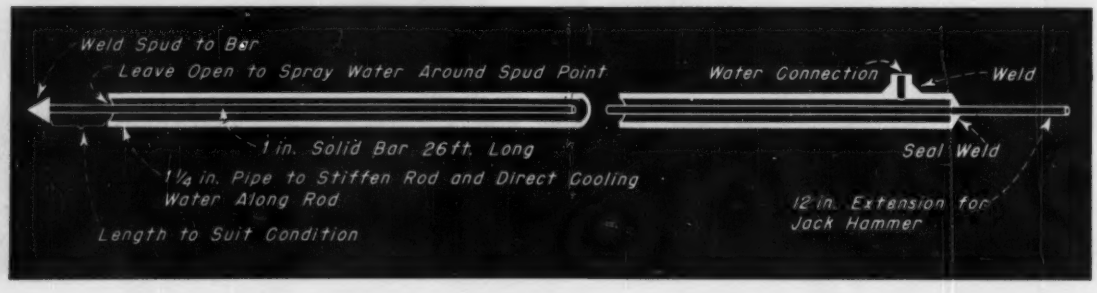
HARRY HOFFMAN, Labor Foreman, Sporn Plant, Central Operating Co, New Haven, W. Va.

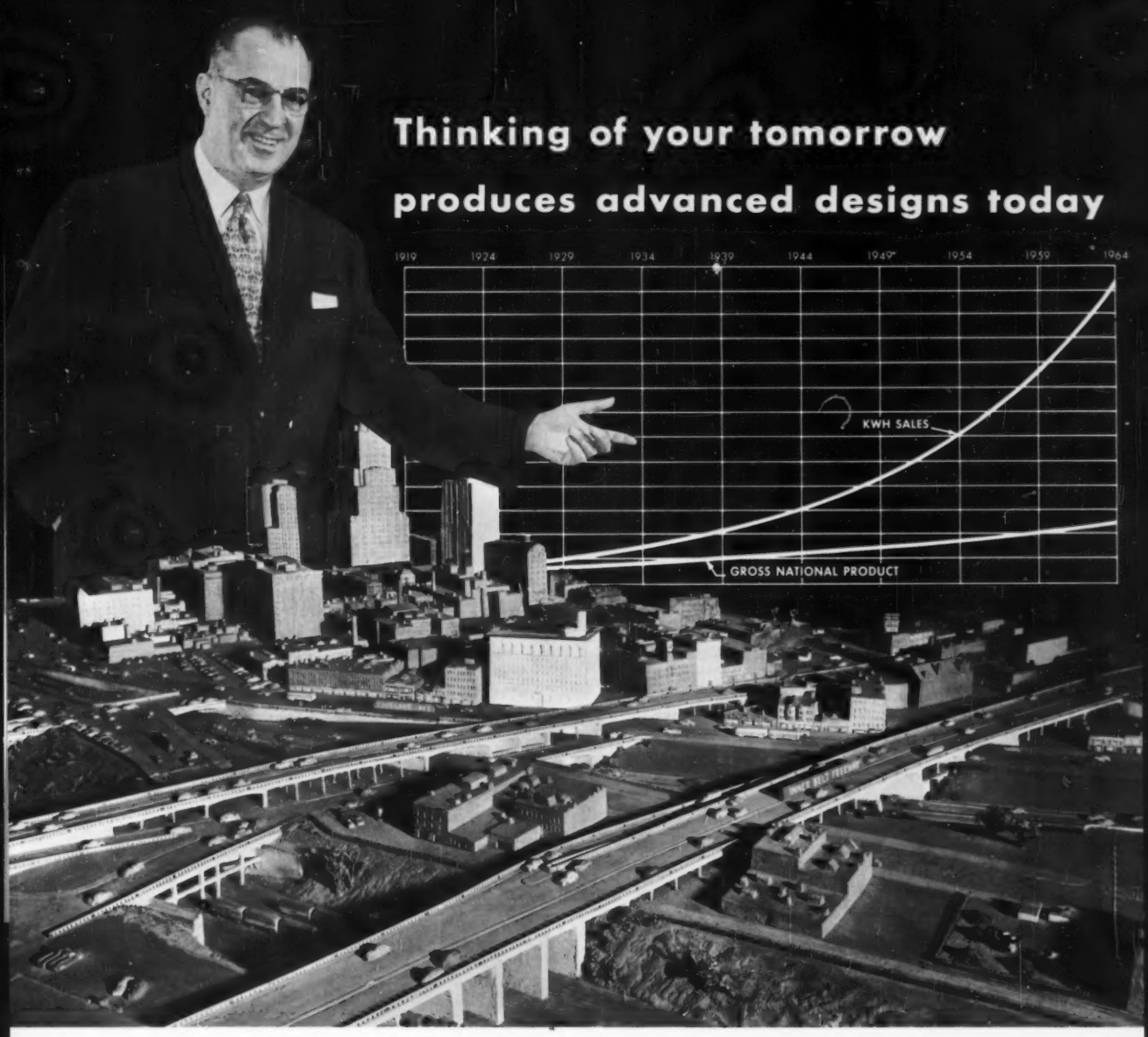
Heavy slag periodically building up on furnace walls sometimes falls in a large mass that lodges in the throat above the ash hopper as a hard clinker. Such a clinker may cover up to 90% of the throat, preventing slag from entering the ash pit and causing it to continue to build up.

Such a clinker is accessible only from below, through the ash-pit doors, and formerly took considerable labor with special lances and bars to break it up so that it could fall through the throat into the ash hopper. As this removal must be performed with the ash-pit doors open, the boiler had to be operated on suction, reducing the capacity and return on investment. In this lies the value of a device which expedites removal of clinkers.

The water-cooled spud, used at Sporn plant, permits use of a pneumatic jack hammer or paving breaker for breaking up the clinker, instead of several men poking at the clinker with a long bar. The spud point on the end of the pipe-enclosed bar is driven into the clinker while water fed between the bar and pipe cools them and sprays on the clinker to soften it.

(*More How To on page* 151)


Weld Spud to Bar
Leave Open to Spray Water Around Spud Point
Water Connection
Weld
1 in. Solid Bar 26ft. Long
Seal Weld
1¼ in. Pipe to Stiffen Rod and Direct Cooling Water Along Rod
12 in. Extension for Jack Hammer
Length to Suit Condition

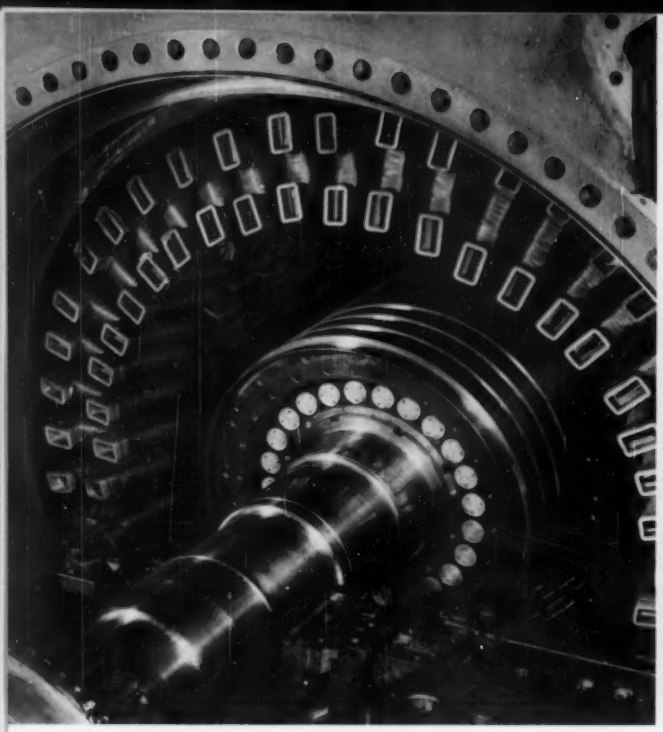


A. C. Monteith, Vice President Apparatus Products, presents some of the Westinghouse achievements in apparatus design . . . features that will help you with your load growth problems.

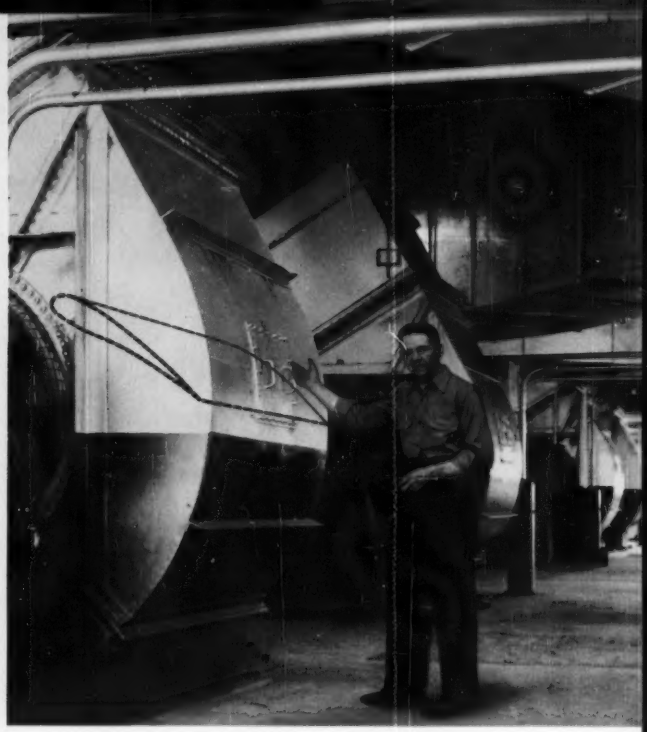
For a quick look at some of these Westinghouse product developments, see the next three pages.

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU!***



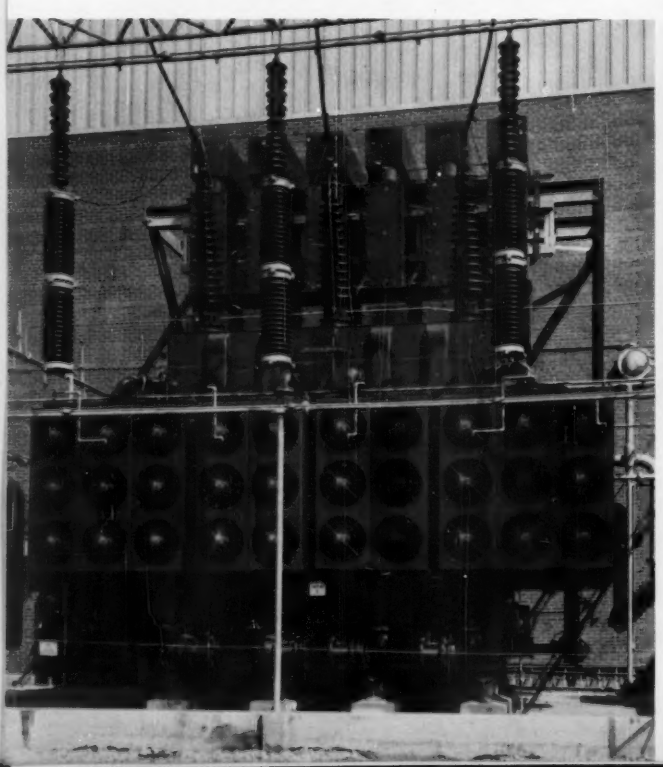
Innercooling Both Stator and Rotor, a Westinghouse first, has made it possible to double generator ratings compared with conventionally cooled units, reducing size, weight.



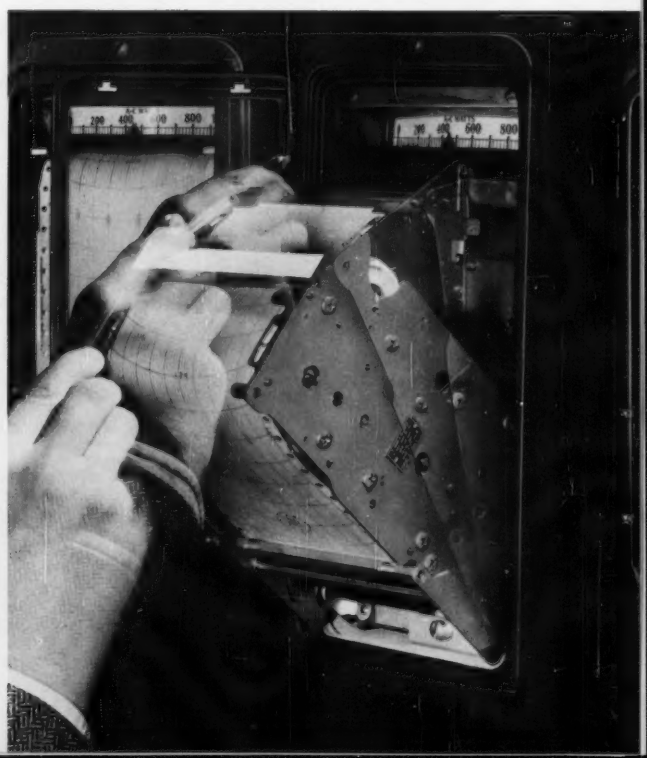
Higher Mechanical Efficiency, up to 92%, is achieved by airfoil blading . . . exclusive in Westinghouse-Sturtevant® centrifugal blowers, the most efficient fans available.

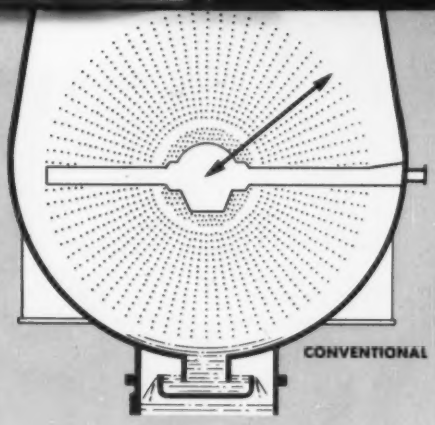
WATCH WESTINGHOUSE

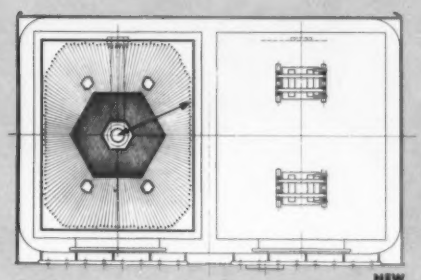
At 315,000 Kva, Largest Capacity 3-phase generator transformer ever built; smaller, lighter per kva than any other transformer. Shipped upright; on-line at Detroit Edison Co.



Twice the Torque of other designs; gives the new Westinghouse Type 44 Recorder faster response, higher fidelity. Accessibility of parts makes it the most convenient to use.







Occupies Less Space while maintaining performance; a dramatic advantage of the exclusive new Twin Bank Condenser, accomplished by dividing steam flow into two paths.

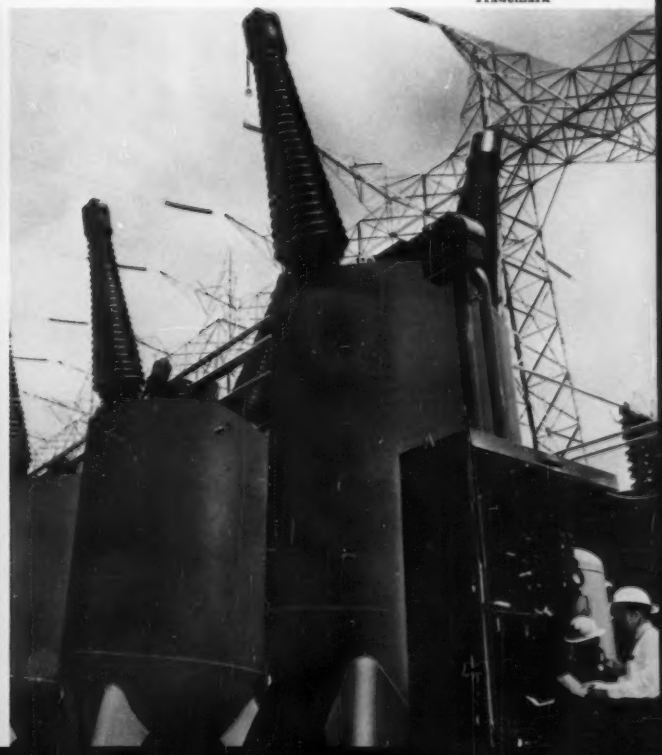
Annual Savings of $50,000 per thousand megawatts can be realized with the revolutionary new Economic Dispatch Computer, recently developed by Westinghouse.

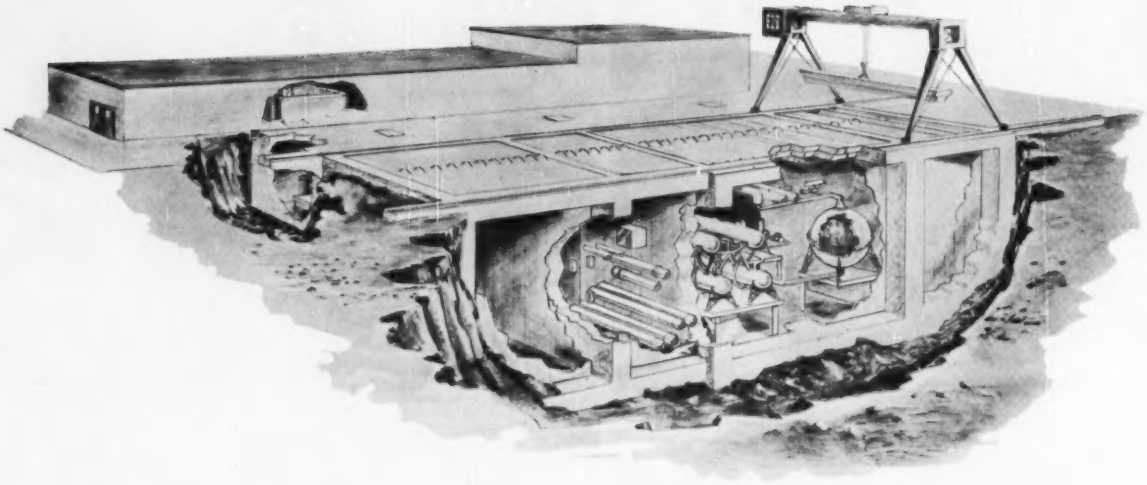
*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU!***

Wrapped-in Dependability for powerhouse motors. That's Westinghouse Thermalastic® insulation, exclusive and still unequaled where moisture, dust and heat are problems.

World's Largest Breaker, rated 330-kv, 25,000,000-kva interrupting capacity. A Westinghouse development made possible by "Watchcase*" design, "De-ion®" grid interrupters.

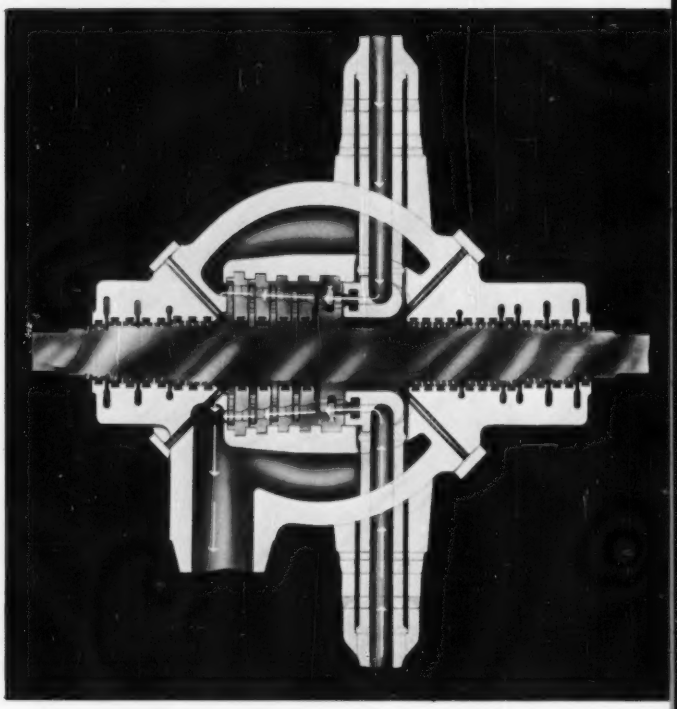
*Trademark





First in Atomic Power, Westinghouse is now pushing forward the development of a very promising aqueous homogeneous nuclear power reactor design, in partnership with the Pennsylvania Power and Light Company.

World's Most Efficient Kilowatt Producer—New supercritical pressure turbine-generator greatly reduces fuel consumption; 5000 psi, 1200°F are highest pressure and temperature ever applied commercially.



The panorama of product development shown here is just a glimpse of creative engineering at Westinghouse . . . and what it is doing for you. New concepts of power generation are inspiring new standards of apparatus capability—higher capacity, greater durability and efficiency, new sources of power. Prime objective: to help utilities meet the fantastic growth projected for the next 20 years.

For specific assistance, get in touch with your Westinghouse sales engineer, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. CP-1038

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU!***

Agriculture Appears Likely Fly Ash Outlet

EDWARD A. RUDULPH, Production Engineering Superintendent, Union Electric Co, St. Louis, Mo.

Trace elements in fly ash, in the proper quantities, improved the health of plant life in a series of experiments which have opened to Union Electric Co a possible low-cost outlet for the steam plant by-product.

In the search for fly ash outlets, Union Electric, like many other companies, has spent substantial sums. For its continuing program, the utility has retained Dr. E. R. Spencer, botanist and plant pathologist, to explore the agricultural possibilities.

Chemical and spectographic analyses show that fly ash contains many trace elements known to be beneficial to plant life. Soybeans, potatoes, onions, and strawberry sets grew better in soil treated with the trace elements. This soil was in pots and in a 1/100th of an acre strip.

Fly Ash Aids Growth

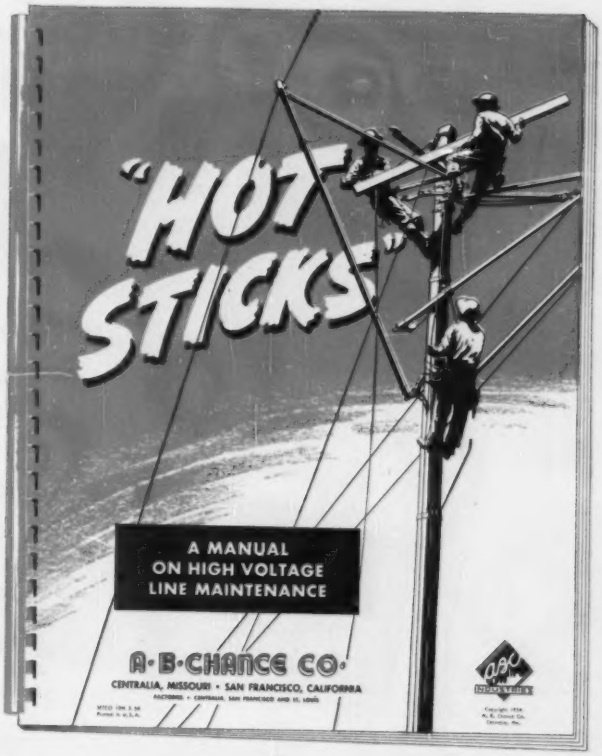
Although decisive results have yet to be obtained from field tests, experimenters are convinced that wheat, oats, corn, and potatoes are healthier where fly ash has been spread on the soil. Bermuda onions and strawberry sets in the 1/100th-acre strip across compost-treated garden soil grew better than the same species on either side of the strip. The strip had been treated three years earlier with 4 tons of slurry fly ash to the acre.

Five of the largest onions selected this year from the treated strip weighed 3 lb 11 oz. Five of the largest from the same row on either side of the strip weighed 2 lb 8 oz. Inspection showed that smaller onions in the treated strip were larger than the smaller ones on either side.

These experiments were on a laboratory scale, and the fly ash was from a single source. Drought conditions in the last two years have largely nullified large-scale field tests.

At the experiments' start fly ash was considered to be a possible condition-

(*Continued on page* 152)



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for job planning and training

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"Hot Sticks" has been years in the making—compiled by experts who *really know* hot line work. It contains 162 pages of detailed explanations—in a lineman's language—and has hundreds of how-to-do-it drawings and step-by-step diagrams that show every important operation.

Supply your live line maintenance crews with this valuable aid to safety. Price is $2.50 a copy. Use the coupon below to place your order.

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FROM A SINGLE COAT of Subox

Some of America's greatest utility companies use a single, thrifty coat of Subox* or Subalox* paint to give them many years of anti-corrosive protection.

The life of a Subox paint job averages 5 to 8 years without any chipping, cracking or blistering. Subox paints effectively resist moisture, fumes, most industrial exposures and also abrasive conditions.

You can securely rely on Subox paints to lower your maintenance budgets, for Subox costs no more than any good paint and saves you money over the years.

Write for a copy of "Corrosion Control of Electrical Structures and Equipment."

*Trade Mark

Established 1924 • 3 Fairmont Plant, Hackensack, N. J.

Subox Inc.

The only paint in America made with suboxide of lead: chemically-active rust-inhibitive and anti-corrosive agent.

See Catalogues in Sweet's Industrial and Engineering Files

ing agent for lightening the soil and giving it better moisture retention. This notion was abandoned. Overdoses of fly ash were found to be toxic to plant growth. Subsequent experiments indicated that dry fly ash has a greater immediate effect and that the optimum quantity per acre is somewhat less than that of the slurry type.

But there is a strong possibility that the slurry ash, with its smaller remaining water-soluble content, may continue to be effective after the water-soluble portion of the dry ash has been leached away. Apparently slurry ash has virtually all the trace minerals which, seemingly, are the basis of the fly ash's effect on plant growth. Seemingly, the water-soluble material is supplied otherwise.

The difficulty of storing dry ash makes its agricultural application somewhat unattractive. Slurried material can be stored in open fields. Consequently, most agricultural research has concentrated on slurried ash.

Traces Found in Coal

The spectographic analysis of Southern Illinois coal given in the accompanying table shows traces of many otherwise rare minerals in the ash. The quantities would not justify reclaiming the minerals. Yet the quantities are sufficient to affect plant life.

Trace elements in soil affect the health not only of plants, but of animals, including man, that feed on the plants. Absence of iodine in soil and drinking water is conducive to goiters. Fluorine in soil and/or water prevents tooth decay. Mice live only a short time on a zinc-free diet. Plant and animal diseases are prevalent where the soil lacks copper.

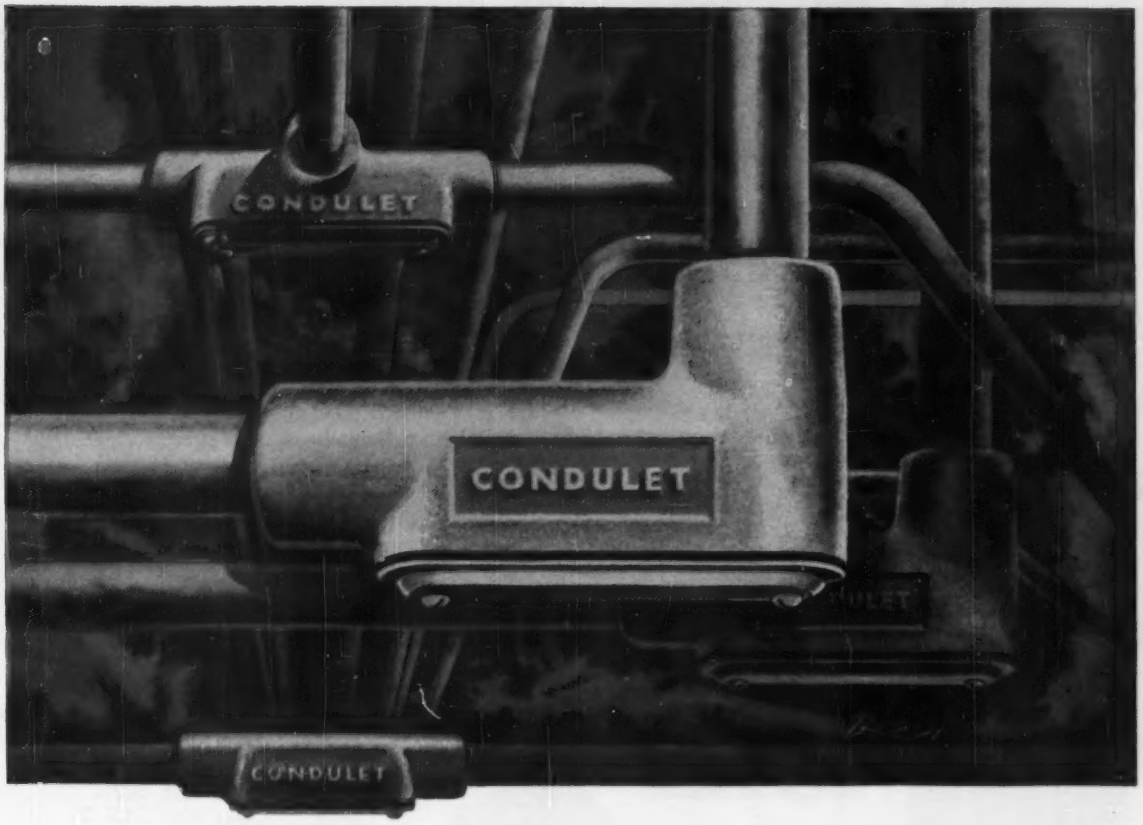
Sheep troubles, such as abortion, "falling disease," sway, and "stringy" or "steely" wool, are cured by the addition of 1 ppm of copper sulphate (i.e., 2 lb of copper per acre) to the soil. Several other diseases of pasturing animals are stopped by adding traces of zinc, copper, cobalt, and other minerals to the soil. Trace elements known to be needed in food or water are: Magnesium, potassium, sulphur, iron, copper, cobalt, manganese, zinc, iodine, boron, molybdenum, aluminum, silicon, chlorine, fluorine, arsenic, lead, and selenium.

As these elements are in even the best cultivated soils only as traces and the effect on plant life is scarcely noticeable, soil can be and often is

(*Continued on page* 154)

Nothing Beats

CONDULETS* and RIGID CONDUIT for FLEXIBILITY, SAFETY, ECONOMY



- **INSTALL ANYWHERE.** Crouse-Hinds Condulets and rigid conduit operate safely and efficiently under all atmospheric conditions and in all occupancies.
- **INCREASE CAPACITY EASILY.** You don't have to tear out and replace the entire system: merely pull additional wires or put in a larger size.
- **ASSURES MAXIMUM SAFETY.** Condulets are Taper-Threaded to provide a permanent low resistance path to ground.
- **GREATER DURABILITY.** Condulets and rigid conduit provide circuits with more protection against physical damage than any other wiring system. Further, Condulets are made of galvanized cast Feraloy, and resist corrosion.
- **LOWER OVER-ALL COST.** First cost is the entire cost — a minimum of maintenance is required.

COMPLETE FLEXIBILITY

There's a Condulet to meet every need of complex modern electrical layouts. See your Condulet Catalog.

A NATIONWIDE DISTRIBUTION exclusively through ELECTRICAL DISTRIBUTORS

*CONDULET is a coined word registered in the U.S. Patent Office. It designates a product made only by the Crouse-Hinds Company.

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MR. PRESIDENT:

WHAT DO YOU KNOW ABOUT RT&E?

As one of America's leaders in the power industry, we think you should know something about one of America's leading suppliers of equipment to the power industry.

We said "leading" not largest. You should know that RT&E, while not big compared to the giants, is nevertheless big in service, in quality, in progress. We've packed hundreds of man years of experience into our ten years of manufacturing.

We think you'll approve our philosophy that we smaller suppliers are most important to the American economy. Sure, we'll be big some day, but in the meanwhile, we help keep the bigger boys on their toes.

For example, no other transformer manufacturer provides a 5 year guarantee or an externally operated tap changer as standard. We do.

All we want to say here is this: Remember the name RT&E. You'll hear it again.

RT&E CORPORATION
WAUKESHA, WISCONSIN

Equipment to help provide power for America

Fly Ash Outlet

(*Continued from page* 153)

depleted of them. Although the vegetation may not reveal this depletion, the food value of the plants is not what it should be. Inexplicable animal diseases begin to show up. The farmer or his advisor today can detect the absence of some elements, magnesium and boron for instance, by simply looking at the leaves.

Spectrographic Analysis

Present in large amounts:

Iron	Aluminum
Calcium	Silicon
Magnesium	

Present:

Vanadium	Strontium
Molybdenum	Manganese
Beryllium	Potassium
Zirconium	Boron
Titanium	Nickel

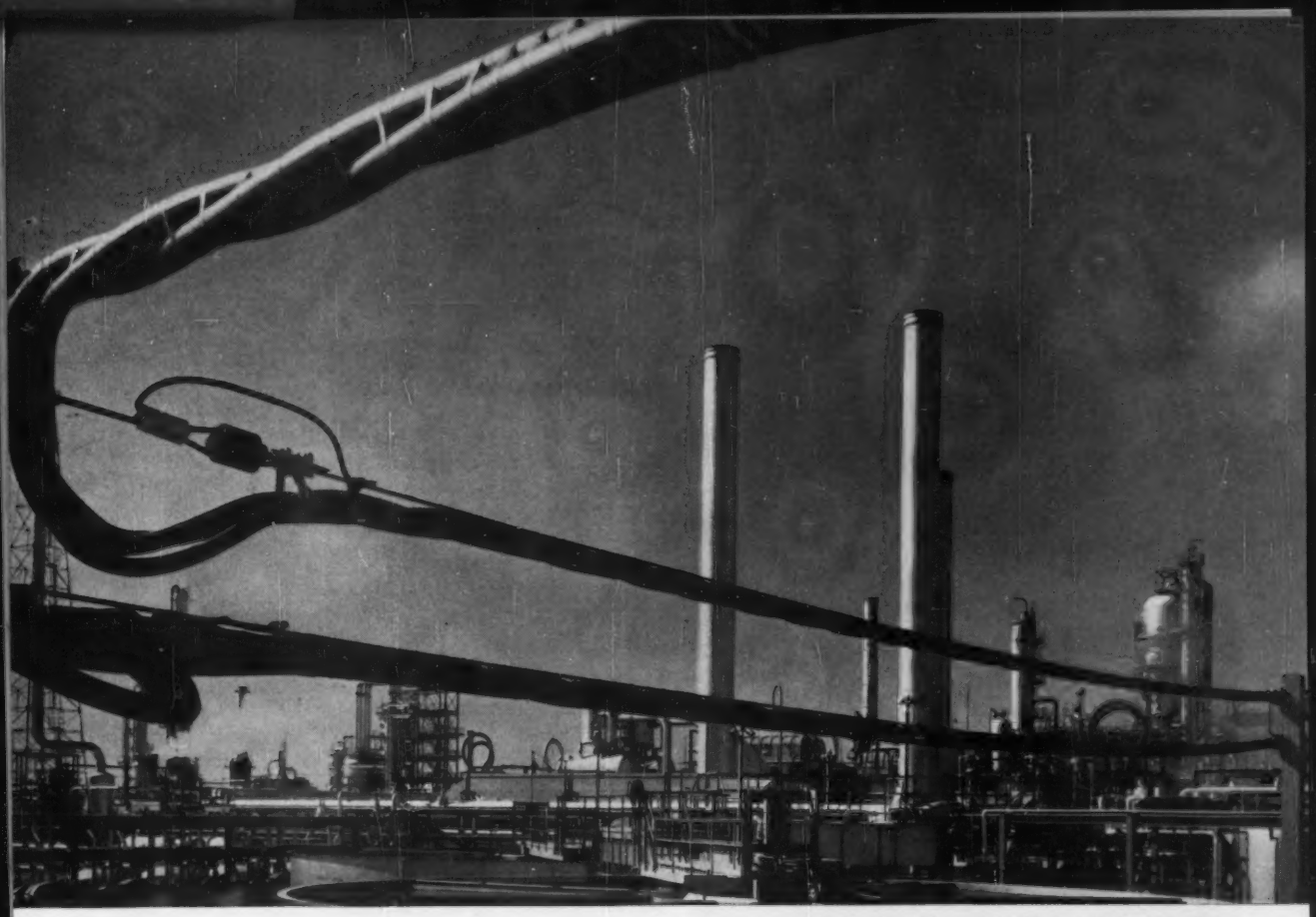
Traces:

Zinc	
Lead	
Tin	
Chromium	
Tungsten	
Indium	Less than .03%
Copper	Less than .0001%
Cobalt	Less than .001%
Germanium	Less than .001%
Gallium	Less than .002%
Silver	Less than .0001%

In 1941-42 Dr. Alfred J. Anderson of Australia obtained field responses to molybdenum, according to The Farmers Digest, December 1955.

"As a result of his discoveries," the magazine reports, "a revolution in the agricultural economy of his country has taken place. Clover yields have increased from nothing to as much as 3 or 4 tons per acre after applications of a few ounces of a molybdenum chemical. Ranchers who have adopted his recommendations have changed thousands of acres of poor soils into improved clover-grass pastures."

Molybdenum is present in fly ash. Only a few ounces per acre of molybdenum are required. Also present are other trace elements the soil requires. Fly ash contains everything that was in the coal, except carbon, hydrogen, and other combustibles. When slurry fly ash has dried out it can be spread as easily as limestone.



Anaconda 15 kv aerial cable installed at oil refinery.

New high-voltage cable cracks the ozone barrier

SAMPLES of Type AB insulated cable bent in small circles are placed in ozone chamber for ozone-resistance test.

Butyl insulation in Anaconda Cable exceeds ozone-resistance test requirements by 2400%

Under high electric stress, minute particles of air break down, form corona. This generates ozone which may combine with the rubber hydrocarbon of the insulation. Without superior ozone resistance, the insulation fails.

But now you can get extra protection against ozone—and ozone damage—with Anaconda Type AB butyl-insulated cable. This insulation is compounded for *inherent* ozone resistance along with other desirable properties.

In standard ozone-chamber test, Type AB insulation (after aging) shows no injury after 72 hours in 0.025-0.030% ozone concentration . . . 24 times longer than required by oil base and butyl specifications.

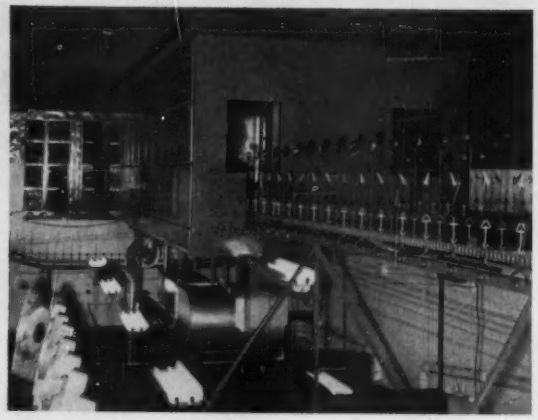
New Engineering Bulletin EB-27 gives full details on performance of Type AB insulation in 15 Industry Specification Tests. See the Man from Anaconda or write: Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y. 54297

SEE THE MAN FROM ANACONDA®

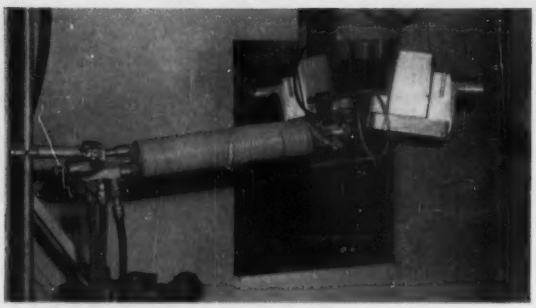
pioneer in BUTYL INSULATION

Mechanization: How Does It Pay?

RICHARD B. SHANNON, Power Sales Representative, Niagara Mohawk Power Corp., Syracuse, N. Y.



Production Goes Up . . .



Unit Costs Drop Dramatically . . .

. . . But a Good Power System Is Needed

Orders are swamping production facilities. Managements of many companies are faced with a basic question: Expand or mechanize—which is better?

Precision Casting Co chose to mechanize. It added a far infrared oven, electrostatic spray painting equipment, an electric degreaser, plating equipment, and new power transformers. Here's what happened:

1. Output was increased 132%.
2. Unit costs dropped.
3. Casting quality improved.
4. Rejects dropped from 8.2% to less than 0.7%.
5. Three of four inspection stations were obviated.
6. A 50% saving in processing materials was obtained.

Before installation of the equipment, a particular job was handled at the rate of 3,000 pieces per 8-hr day. Functions performed were racking, degreasing, cleaning, phosphate coating, drying, painting, and baking. Four inspection stations were needed to assure quality output.

After installation of the new equipment, more than 7,000 pieces per 8-hr shift could be processed with a simultaneous improvement in quality. The reject and salvage percentage has dropped dramatically. Three of four inspection stations are not needed, product quality is more uniform; processing materials go farther.

As the production is now organized, parts are placed on a conveyor and are not handled again until they:

- Pass through a 24-kw degreaser.
- Receive a coat of paint applied automatically.
- Dry in a 100-kw infrared recirculation-type oven.

This process has materially improved production efficiency by reducing the number of manhours involved.

The company then sought ways of diversifying the type of job done in its plant. Because many customers wanted plated castings, management decided to add plating equipment to enable them to offer customers a finished job. Subsequently, 125 kw in plating equipment were installed. However when the new load was added to the paint shop load, it tended to strain the plant's electrical system.

Power Distribution System Strengthened

It was recommended that the company's vault of three 150-kva transformers be replaced by three 250-kva transformers, and that plant distribution circuits be revamped. In addition, it was suggested that an air breaker be used on the secondary side supplying the additional feeders.

These recommendations were accepted. Now the company is realizing increased production at lower cost through proper application of electric power. Furthermore, the plant's electrical system now is capable of absorbing future growth load.

Mechanization has paid off handsomely for Precision Casting Co, as it has paid off for many other firms.

G&W Overhead Style—
AUTOMATIC TRANSFER OIL SWITCHES

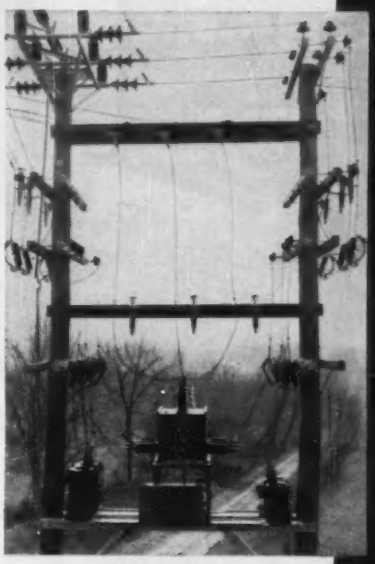
help provide service continuity by transferring important loads to an alternate feeder automatically.

G & W Type "RA" oil switches with Model "F" operating mechanisms are furnished as practical, economical and remarkably trouble-free units for pole top or overhead installations as well as for vault or underground locations.

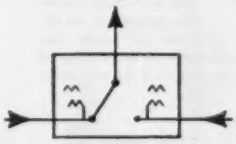
Oil switch and mechanism case of heavy welded steel construction, hermetically sealed. Units are available in double throw (as shown) or as two single throw oil switches in separate tanks. Switching contacts in oil are protected against corrosion. Rated 400 amperes full load break.

What the Model "F" Mechanism does—

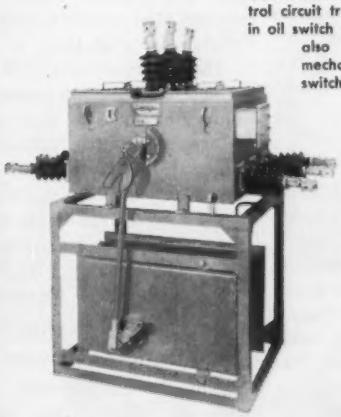
- When preferred feeder voltage fails, the load is automatically transferred to the emergency feeder.
- When preferred feeder voltage is restored (for a period of ¾ minute) the load is automatically returned to the preferred feeder.
- There is no "hunting" on system disturbances. Load cannot be thrown to a "dead" source.
- Model "F6" automatic mechanism provides for remote operator selection of either feeder as the "preferred."



Typical installation of a 15 Kv. unit. Standard pole top transformers supply 230 volt control circuit.



RATINGS—400 AMPERES.
5 Kv.—7.5 Kv.—15 Kv.—23 Kv.



15 Kv. double throw unit with control circuit transformers enclosed in oil switch tank. Overall space also saved by locating mechanism under the oil switch.

Simple and easy to install—

With control circuit wiring within the mechanism case completed at the factory, installation of the unit involves mounting the unit and making the load and two feeder connections.

Get in touch with us or our representatives for further data and prices on automatic transfer oil switches to meet your requirements.

G&W ELECTRIC SPECIALTY CO.
7780 Dante Avenue, Chicago 19, Illinois

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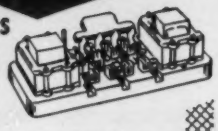
Canadian Mfrs.—Powerlite Devices, Ltd., Toronto, Montreal & Vancouver

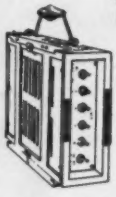
D564

Recommended
these
METER TESTING ACCESSORIES
Now in use by Leading Utility Companies

PHASEFORMERS



ACCURATELY MEASURES REACTIVE POWER: when properly connected to a watthour meter will provide for that meter the proper potentials lagging 90° in phase from the normal circuit potentials, together with a switching arrangement whereby the meter connected thereto can be checked as a straight watthour meter.

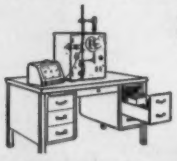


TYPE TRF RESISTANCE LOAD

The addition of a current operating fan on this item is to aid the natural draft condition and make possible a maximum capacity of 24 amperes load current at 240 volts in an aluminum case.

ROTARY TAP SWITCH

ALL INCLUSIVE FEATURES: high current capacity, non-arcing, high voltage capacity, inductive load capacity, numerous circuit combinations, special high current connections, positive action, compact design, fully enclosed.



METER TEST BOARD

So many requests have been received to provide a packaged, up-to-date, compact meter test board unit, we are presenting this equipment which has many features for efficient operation.

Write for Complete Information

EASTERN SPECIALTY CO.
PHILADELPHIA 40, PA.

Utility checks its auto repair garage and proves . . .

Good Light Pays Handsome Dividends

C. M. THOMPSON, Engineer in Charge of Commercial Lighting Sales, San Diego Gas & Electric Co, San Diego, Calif.

San Diego Gas & Electric Co has set a good lighting example in its automotive repair shop that is paying off handsomely in employee contentment and reduced maintenance. A visiting aircraft plant official was so impressed with the lighting and employee morale that a similar 60 ft-c system subsequently was put in a new building at his plant.

Personnel Like Lighting

When the utility's new repair shop was built, a fluorescent system was designed so men could see and work easily. The men commented then that the lighting was "perfect." Their opinion has not changed after two years, for they have found that they work faster. One reason: The higher illumination level and shadow-minimizing nature of fluorescent lights has obviated drop lights for most operations.

Maintenance-wise the fluorescent system is good. After 7,500 hr of burning, these fluorescents are group-replaced. Incandescent lamp replacement is seven times more often.

Checks show that the auto repair shop's lighting dropped from an initial 60 ft-c to 40—normal depreciation for installations of this type. Ballast failures have amounted to not more than four.

The main shop is lighted with 3-lamp, 8-ft, industrial fixtures using cool white T-12 lamps. Fixtures are mounted 19 ft above the floor in rows on 14-ft centers. After two years' service, illumination is still considered "even." It varies from 38 to 42 ft-c.

The pits, measuring 25 x 3½ ft, are lighted with 3-lamp vapor-tight 4-ft luminaires staggered three on one side and two on the other. Readings taken under cars, with the cell facing the lights, average 28 ft-c. Shadows are practically non-existent because of lamp spacing and the white-painted walls. (The pits are still white. The men say they can *see* dirt now and wipe it up.)

Bin Lighting Continuous

Bins are lighted with continuous runs of single lamp strip lights equipped with cross baffles using 8-ft T-12 tubes. After two years' service, readings show illumination to be 28 ft-c at the top of the bins and 10 at the bottom.

The men who maintain this lighting system say that, for the square footage involved, it takes the least time to keep up of any they have.

PAGE & HILL PUT LONGER LIFE IN POLE LINES

From Page & Hill research come the secrets of longer pole life . . . preservative formulae, methods of treating, test plots, constant checking of pole lines subjected to every kind of exposure. The reward is this: Every P & H "Life-Span" Pole that was installed 15 years ago is still serving today without a sign of even mild decay! And the research continues.

For you, this means fewer replacements . . . a reduced workload for your crews . . . better service to your customers.

Of this you can be sure—"Life-Span" Western Red Cedar Poles are completely immunized against fungi and insect damage from top to butt. They are nature's best with the finest preservative protection yet developed. Clean and odorless, too.

LIFE-SPAN

WESTERN RED CEDAR POLES

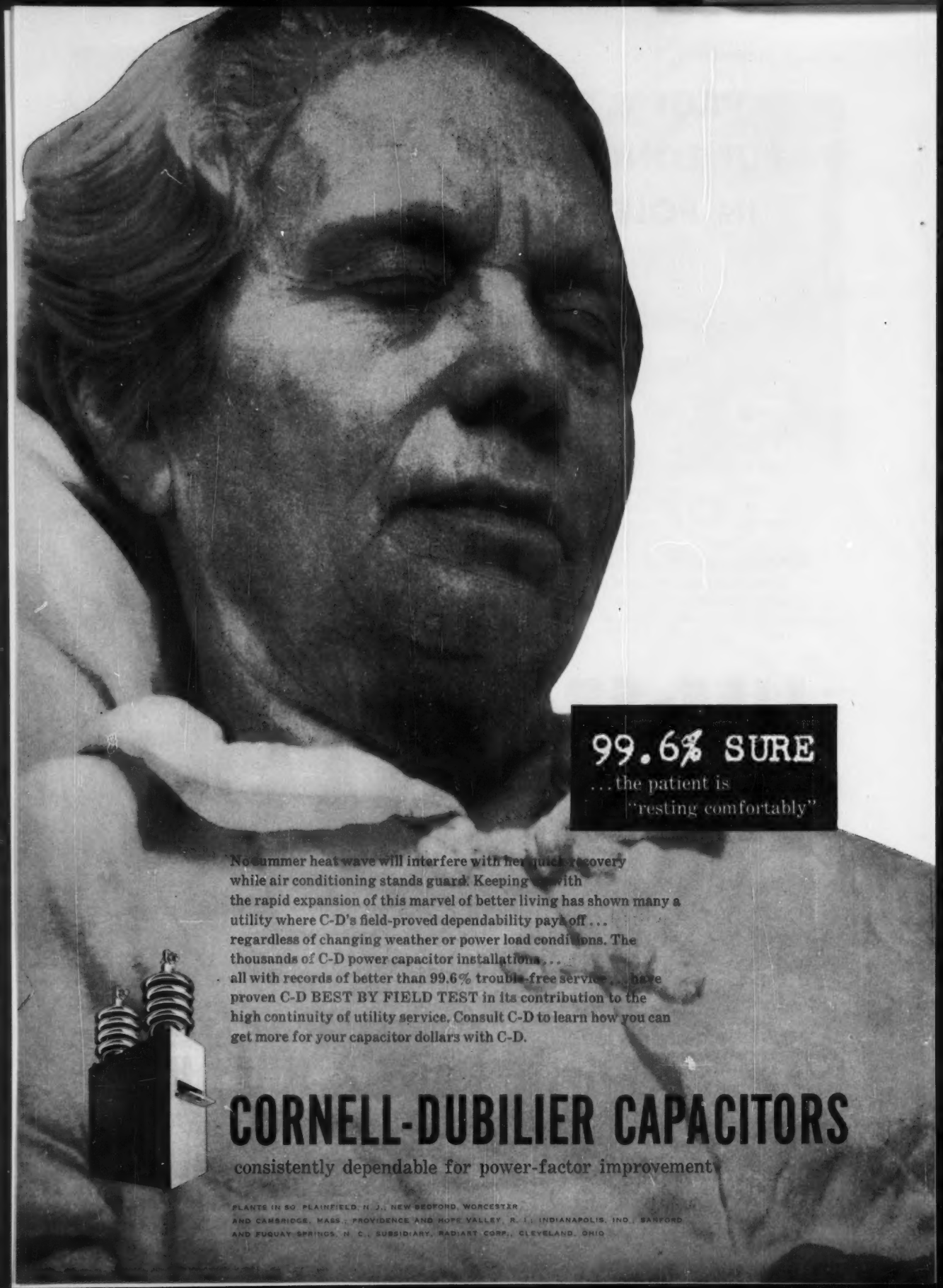
BUILT BY NATURE

Life Span

Write today for complete information:

PAGE & HILL, INC.

MINNEAPOLIS 3, MINNESOTA



No summer heat wave will interfere with her quick recovery while air conditioning stands guard. Keeping pace with the rapid expansion of this marvel of better living has shown many a utility where C-D's field-proved dependability pays off... regardless of changing weather or power load conditions. The thousands of C-D power capacitor installations... all with records of better than 99.6% trouble-free service... have proven C-D BEST BY FIELD TEST in its contribution to the high continuity of utility service. Consult C-D to learn how you can get more for your capacitor dollars with C-D.

CORNELL-DUBILIER CAPACITORS

consistently dependable for power-factor improvement

PLANTS IN SO. PLAINFIELD, N. J., NEW BEDFORD, WORCESTER AND CAMBRIDGE, MASS., PROVIDENCE AND HOPE VALLEY, R. I., INDIANAPOLIS, IND., SANFORD AND FUQUAY SPRINGS, N. C., SUBSIDIARY, RADIART CORP., CLEVELAND, OHIO

CORNELL-DUBILIER
power-factor
capacitors
give you better than 99.6%
trouble-free service*

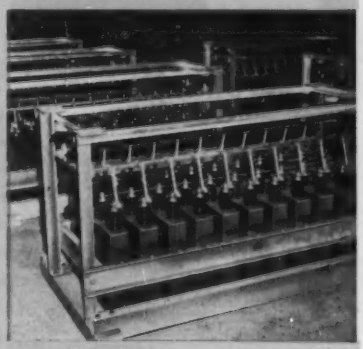
C-D capacitors are impregnated and filled, in hermetically sealed containers with non-inflammable, non-explosive Dykanol. In addition, C-D's conservative engineering and design makes possible the use of special impregnants to fulfill even the most exacting requirements of sub-zero switching operations.

C-D's rack capacitors are shipped completely assembled ready for energization. Again C-D's conservative engineering standards provides the structural strength to do this and as a result save the utility time, assembly and installation costs in the field.

Lowest volts per mil unit stress results in the extra margin of safety necessary to withstand all system high voltage transients. This lower volts per mil and lower volts per section feature is the utility's assurance of extra longevity when C-D's are specified.

Only C-D power capacitors are subjected to a full-rated voltage energization test. C-D removes potential trouble-makers before they get on your poles . . . not after with costly replacements.

Why is it that only C-D power capacitors give you assurance of complete dependability?... because C-D's built-in safety factor results from the ultimate in tried and proven design levels coupled with conservative production techniques and rigorous quality control. For catalog write to Cornell-Dubilier Electric Corporation, South Plainfield, N. J.



C-D 550 KVAR; 2,400V; single-phase, open frame, stacking rack capacitor assemblies.

*This is an average based on reports from leading utilities using C-D capacitors. Many of these reports have shown 100% trouble-free service, and none lower than 98.9%.

INDUSTRIAL BRIEFS

Preventing moisture condensation on walls and equipment in Katz Underwear Co's deep well pump house in Honesdale, Pa., has been accomplished with a 7.5-kw electric space heater with thermostatic control. This heater maintains a 45F temperature in the cinder block building. Faced with brick, the pump house is 300 ft from the main building—too far away to be heated by the plant's system. The new installation has cut maintenance costs. Charlie Millar, Industrial Representative, Pennsylvania Power & Light Co, Wilkes-Barre, Pa.

Solving a space heating problem at St. Louis Lithographing Co has been done with two 4.5-kw natural-convection-type, floor-mounted heaters. A central heating plant normally keeps employees warm in the art room. However, a large process oven overheats the production area when used. To keep production employees cool, the central steam heating plant is throttled back. Then to keep art department employees warm, the electric heaters are switched on. George C. Wagner, Industrial Engineer, Union Electric Co of Missouri, St. Louis.

Handling corn syrup in huge quantities is made easy by 20 kw of electric heat at Delvale Dairies, Inc, Baltimore, Md. At room temperature corn syrup becomes practically impossible to pump through pipelines. But 4 kw of heating cables wrapped around the pipes, and 16 kw of strip heaters on the 3,800-gal storage tank, hold the syrup almost at the consistency of water. The heaters are switched on and off thermostatically to maintain 100F. R. L. Bart, Industrial Representative, Baltimore Gas & Electric Co, Baltimore, Md.

Brazing aluminum to aluminum is done now in a 27-kw electric furnace at Aldon Products Co, Duncannon, Pa. This company, working on Navy contracts, faced a critical problem, for brazing temperature must be held within two degrees of 1090F. A temperature of 1100F will deform aluminum pieces. The electric installation, with its close temperature control advantage, satisfied the plant owner so well that he ordered an additional 39-kw furnace. Brent Shunk, Industrial Representative, Pennsylvania Power & Light Co, Harrisburg, Pa.

Electric Heat Goes Big Time

NEMA makers unleash nation-wide promotional drive. Their goal: Three million completely electrically-heated homes in next 10 years

Electric heating manufacturers are getting ready to promote 3 million completely electrically-heated homes by 1966—a goal which would mean 16 to 27 billion kwhr of new load on utility lines.

"We aim to make electricity as commonly accepted for house heating in the coming ten years as gas and oil are now," declared R. E. Pequignot at a press conference in New York this month. Pequignot, who is chairman of National Electrical Manufacturers Association's Electric House Heating Equipment Section, told some 80 assembled newsmen of a nationwide promotional program his group will unleash. Spearheading it will be:

1. An 18-min sound-slide film;
2. A two-color consumer folder, "Heat Your Home Electrically";
3. "NEMA Manual for Electric House Heating," the industry's first basic buide for installation design.

"As the American consumer upgrades his whole standard of living, he is going to demand better ways to heat his home," Pequignot declared. "Electric heating is the next logical step."

In addition to new homes, electric heating equipment makers see a great market in existing homes—particularly those that remodel and add extra rooms, the press conference was told. Market studies show that at least a million homeowners will add new rooms this year, Pequignot said.

There are a number of factors behind the NEMA house heating manufacturers' decision to move into the heating market on a big scale. Most of these center around changing conditions within the electrical and construction industries.

First, they said, is the new encouragement they're getting from utilities. More and more of them are promoting the load as a winter-time offset to growing peak summer demands brought on by the boom in air conditioning. They cited the increasing number of utilities which are setting up budget billing plans and adopting heating rates in the range of 1¢ to 2¢ per kwhr.

Utilities, they said, also recognize that peak demand for air conditioning occurs at a time when transformers and distribution lines already are running hot because of ambient conditions. Electric heating loads, they declared, occur when transformers and distribution lines are cold and can carry maximum loads without trouble.

Second, they pointed to the electrical contractor and distributor. The electrical contract for a house electrically heated is about three times that of a conventionally-heated home. The distributor, by selling electric heating can up his share of a home's total dollar volume by about eight times.

Third, they point out that the architect and builder can gain space and save construction costs by eliminating need for furnace rooms, pipes, ducts and chimneys.

Pequignot said the section's promotional materials all are available to electric utilities. The film sells at $15 (including transcription and 100 copies of the folder), and the folder, alone, for $12.50 per thousand. Price of the manual is 25¢ per copy. Direct orders to NEMA Electric House Heating Equipment Section, 155 E. 44th St., New York 17, N. Y.

Ceilheat, Inc. photo

Booms Housing Project Sales

J. K. (Pat) Flanagan, right, Florida Power Corp's public relations director, looks over sample of new embedded cable electric heating jobs going into one of southeast's largest residential developments near Orlando, Fla. Bernard Archer, left, Sales Manager for New Azelea Park project, reports electric heating helped sell $100,000 in new homes and $500,000 in tentative orders on first day development opened. Electric heating was headlined as leading feature in newspaper ads which ran on opening day.

Want smaller, lighter transformers and oil circuit breakers?

Then **LOCKE'S TYPE U** is the bushing for your apparatus!

Type U is the high voltage apparatus bushing which gives you all the desirable electrical characteristics of earlier bushing designs PLUS the added advantages of smaller dimensions and lighter weight.

For example, Locke's 161 KV Type U bushing is 6¼" *smaller* in ground sleeve diameter, and 590 lbs. *lighter* than its equivalent of earlier design. There is no sacrifice in dielectric strength.

Specify Type U for your apparatus, and chances are good you'll find that your transformers and oil circuit breakers will come to you accordingly smaller and lighter.

For replacement purposes, Type U is ideal because you can handle it more easily during installation . . . and less storage space is required.

Consult your apparatus manufacturer, or send today for complete descriptive literature.

Unusual Radio Noise Test Procedure . . .

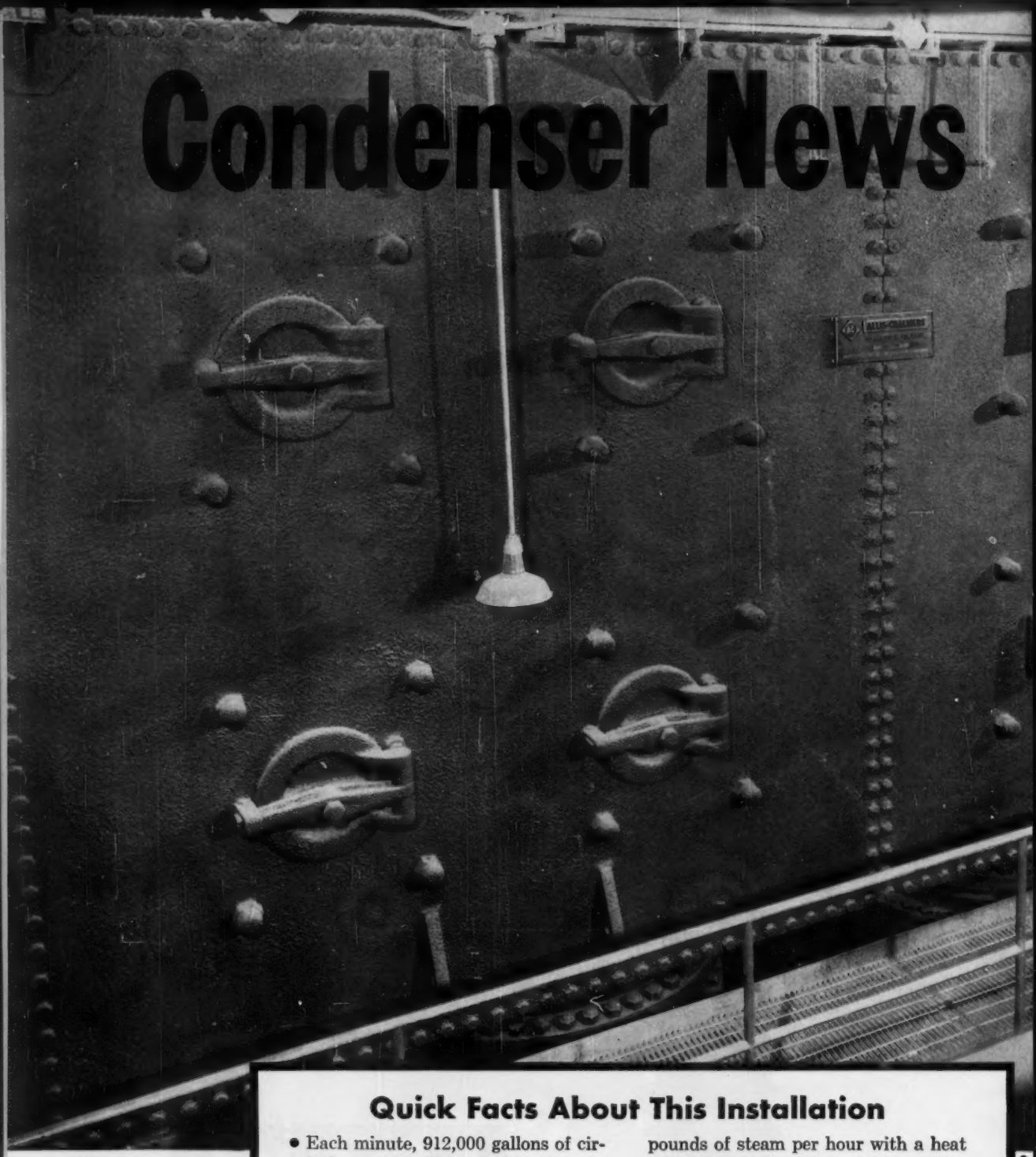
Photo shows radio noise test of 287.5 KV Type U bushing. (Today, radio noise is almost zero.) *Each* and *every* Type U bushing is radio noise tested both *before* and *after* one minute ASA standard high potential dry withstand test. This procedure is unusual as the common industry practice is to test on a selected sample basis. Locke makes this and other extra tests to insure uniform bushing reliability.

FOR 92 KV AND ABOVE

LOCKE

LOCKE DEPARTMENT
GENERAL ELECTRIC COMPANY
BALTIMORE, MARYLAND

Condenser News

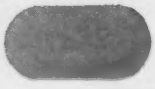


Quick Facts About This Installation

- Each minute, 912,000 gallons of circulating water will be used in the condensers . . . enough for a city of approximately 8,750,000 people.
- Each condenser will handle 979,000 pounds of steam per hour with a heat rejection rate to water of 930 million Btu per hour.
- About 500 miles of tubing went into the six 100,000-sq-ft condensers.

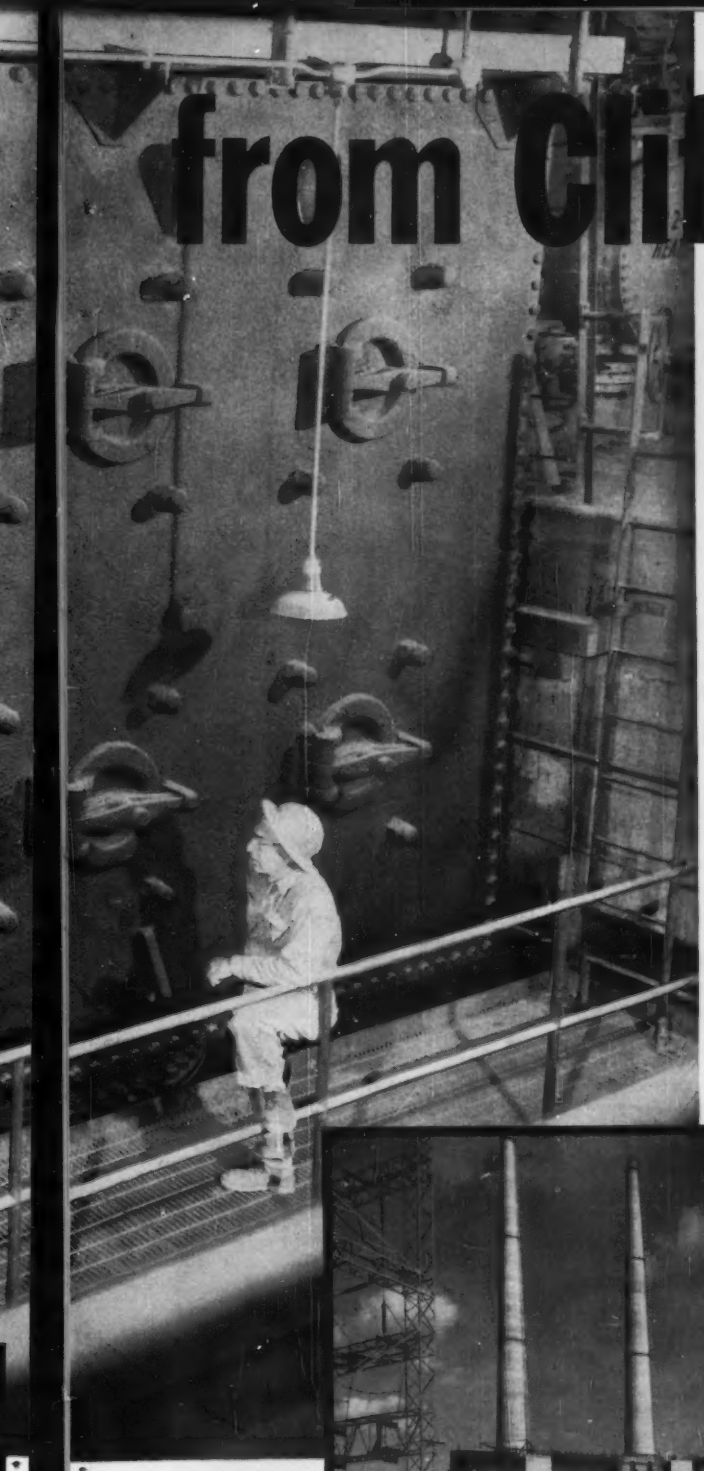
A Size and Type for Any Need

Round

 Oval

Rectangular

ALLIS-



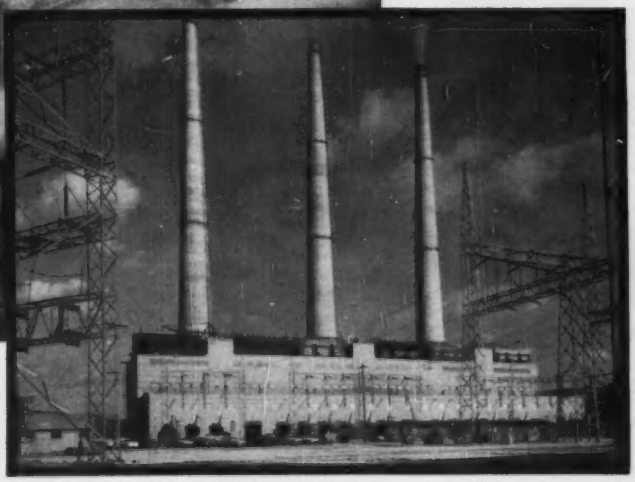
from Clifty Creek

World's Largest Investor Owned Generating Plant Completes Installation of Sixth Allis-Chalmers Condenser

More power for the Atomic Energy Commission! Giant Clifty Creek Plant, with a capacity of 1,290,000 kilowatts — more than that of Hoover Dam — is the largest power plant ever built by private enterprise.

Just completed, Clifty Creek is one of two major steam plants built by the Ohio Valley Electric Corporation to supply the electric power requirements of AEC's tremendous new Portsmouth (Ohio) atomic plant. Clifty is located on the Ohio River at Madison, Indiana. OVEC is sponsored by 15 private utility companies of the Ohio Valley region.

Six 100,000-sq-ft, single-pass Allis-Chalmers surface condensers serve the Clifty Creek Plant's six 215,000-kw steam turbine-generator units.



Condensers of Unusual Design

Multi-steam-path design is a feature of each condenser. This unique A-C design makes *all* tubes completely effective from one end to the other by directing steam to even the most remote sections of the condenser.

The result is high vacuum, high condensate temperature and good deaeration . . . in other words, high operating efficiency.

Get Information

For information about Allis-Chalmers multi-steam-path design, contact your nearest A-C office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin. A-5038

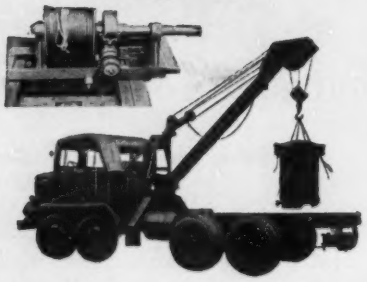
LIVE BETTER ELECTRICALLY

CHALMERS

A-C ALLIS-CHALMERS

Utilities Have Specified
SILENT HOIST Equipment
• Since 1918 •

KRANE KAR Swing-Boom Mobile Crane: for materials-handling . . . lifting, transporting, positioning, gasoline or Diesel, 1½, 2½, 5 and 10 ton capacities, 9 to 37 ft. booms (or telescopic booms), solid or pneumatic tires. Self-stabilizing without jacks or outriggers; unobstructed vision; fast, flexible, safe, easy to operate.



WINCHES: Capstans; Single and Double Drum, Jaw Clutch, Keyed and Friction Clutch Winches. 2,000 to 50,000 lb. Capacities.

SWING-BOOM CRANES: Truck: Motor Power Operated; high capacity; takes up only a small space. For handling transformers, cable reels, lamp posts, trees, poles, manhole castings, etc. 9 to 31 ft. booms; one to 10 ton capacities.

TOWERS: 2 or 3 section type and Pantograph types, with plain, revolving or racking platforms.

TRIPOD POLE DERRICKS: for 35 ft., 45 ft., and 60 ft. Poles; single piece or telescopic side legs; removable cast steel fittings.

USERS: AT&T; N. Y. Tel. Co.; T.V.A.; Consolidated Edison Co.; W.U.; Municipalities throughout America.

WRITE FOR CATALOGS:
No. 79—KRANE KAR *No. 70—Truck Equipment*

THE ORIGINAL SWING BOOM MOBILE CRANE WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER
2½, 5, AND 10 TON CAPACITIES
KRANE KAR
TRADE MARK REGISTERED
SILENT HOIST & CRANE CO.
862 63rd ST., BROOKLYN 20, NEW YORK

SALES AND SERVICE

THOUSANDS OF PEOPLE each day get LBE message via this gaily-decorated tractor-trailer which carries appliances, line materials to Gulf Power's local offices

LIVE BETTER ELECTRICALLY

How to Bat .500

Using personal calls, Gulf Power lines up strong LBE help from half its sales allies

Personal calls on important trade allies are boosting Live Better . . . Electrically teamwork for Gulf Power Co.

"Although this is time-consuming work, it's well worth it," say C. R. Yarbrough and H. W. Olcott who are directing the campaign for L. A. Johnston, Gulf Power's sales promotion manager. "Currently, as a result of personal contact, one-half of the Pensacola appliance dealers, together with a number of banks, contractors and realtors, are actively pushing the LBE idea in their advertising and promotion."

The face-to-face approach followed up the February closed-circuit LBE telecast in Pensacola and subsequent dinner meetings in seven outlying cities. Sales promotion people from the utility outlined their own campaign on personal calls and urged local tie-in for greatest public impact.

Some of Gulf Power's promotion devices:

- An eight-page homemakers supplement that ran in the Pensacola News-Journal featuring LBE news stories and ads; similar supplements are planned for other papers.
- Radio interviews with utility executives and key trade allies on the subject of electrical living; 60-sec LBE spots on 10 local stations.
- A portable LBE exhibit now circulating among department stores, dealers, and banks in Pensacola and neighboring cities.
- A tag for appliances coming out Gulf Power's service department that reads: "This appliance has been repaired and is now ready to help you Live Better Electrically. But it must have Housepower to operate properly."
- A direct mail "Electrical Quiz" that has gone to 25,000 northwest Florida homeowners.
- LBE decals on all line trucks and service vehicles.
- Banners and streamers in company buildings and shops.
- LBE emblem on monthly service bills and all metered mail.

No Self-Service Sales of Appliances, Says Maker

Self-service never can replace personal selling of appliances, declares J. S. Pettersen, Norge Division of Borg-Warner Corp.

"Buying an automobile or major appliance" is a major event in any person's life he told a recent Chicago Tribune forum. They will continue to be sold one by one, by one person to another person.

The American public is not going

(*Continued on page* 168)

One Meter for Two Types of Services

DUNCAN TYPE MK

2- or 3-wire singlephase

Two-Wire TODAY

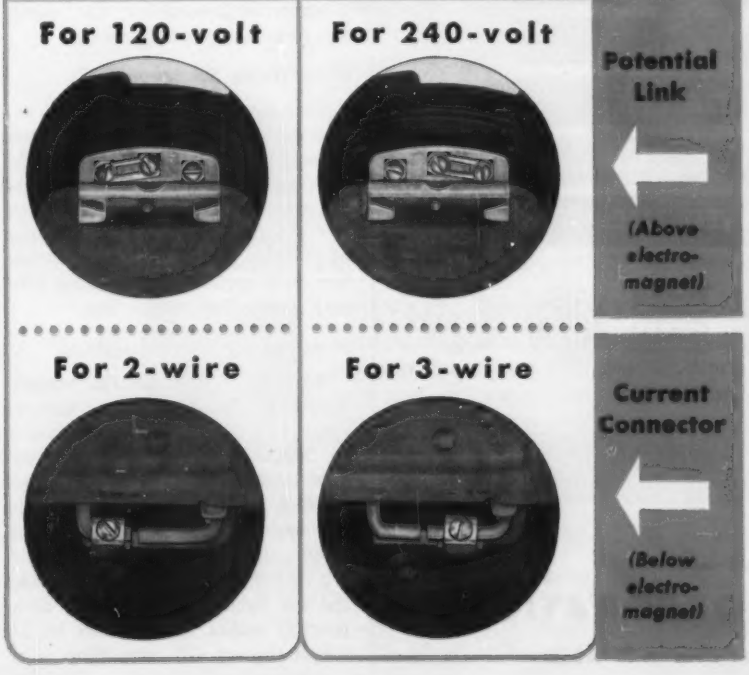
Three-Wire TOMORROW

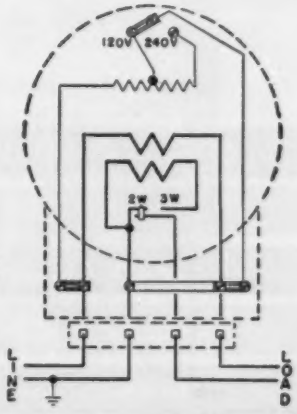
● The Duncan Type MK 15 amp *2-3 wire* meter may be used to meter either a 120-volt *2-wire* or a 240-volt *3-wire* service. This type of meter is particularly applicable where new *2-wire* meters are needed now but would be obsoleted soon as services are changed to *3-wire*.

The MK 15-ampere *2-3 wire* is of the "extended range" type and has full 100 ampere capacity when used on either a *2-* or *3-wire* service. The added capacity of the MK meter keeps it ahead of the expanding use of electric energy.

The meter is quickly converted from one type of service to the other by moving two links—*see illustrations below*. When converted, the calibration may be checked if desired, however the inter-range accuracy is within accepted commercial limits. Close accuracy on either type of service is made possible by a tapped potential coil—the mid-tap designed for 120-volt operation, the full coil for 240-volt operation. To keep the K_h constant the same for either service, one current coil is used for *2-wire* operation and both coils are used for *3-wire* operation (see connection diagram).

Changing Is Simply a Matter of Moving Two Links



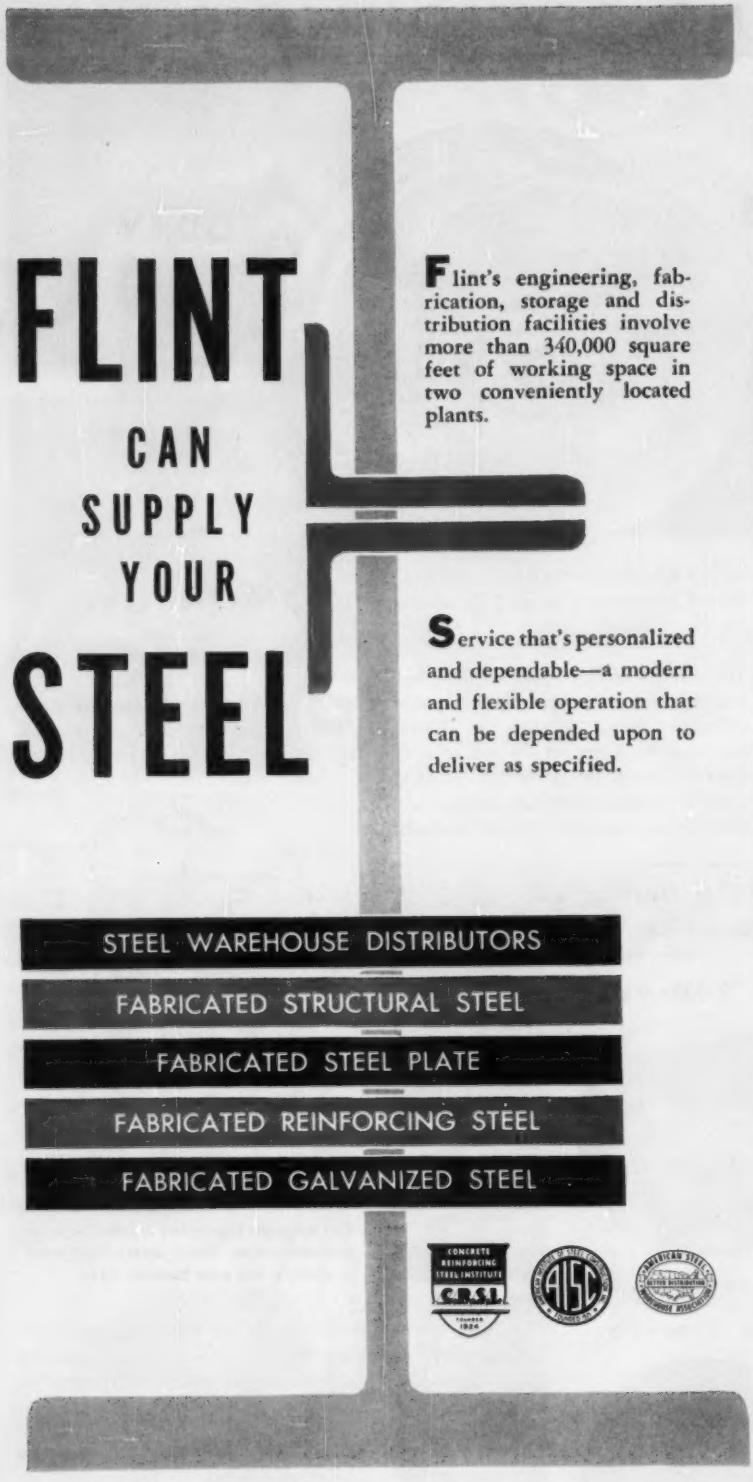


This diagram illustrates typical 2-3 wire connections for MK-A meter. The MK-S is similar. See new Bulletin 185.

This is a Duncan contribution to better, more economical metering.

DUNCAN ELECTRIC MFG. CO.
Lafayette Indiana

(Advertisement)


FLINT
CAN
SUPPLY
YOUR
STEEL
Flint's engineering, fabrication, storage and distribution facilities involve more than 340,000 square feet of working space in two conveniently located plants.
Service that's personalized and dependable—a modern and flexible operation that can be depended upon to deliver as specified.
STEEL WAREHOUSE DISTRIBUTORS
FABRICATED STRUCTURAL STEEL
FABRICATED STEEL PLATE
FABRICATED REINFORCING STEEL
FABRICATED GALVANIZED STEEL
CONCRETE REINFORCING STEEL INSTITUTE
CRSI
AISC

for over 40 years

FLINT STEEL CORPORATION

TULSA . . . MEMPHIS

No Self Service

(*Continued from page* 166)

to be naive enough to walk into a store and pick up a refrigerator on their back and say, "this is the way I want to buy my goods," he went on. They want to be romanced. They want to be loved. And they want to hear a complete story on this major appliance.

Speaking at the same meeting, Arno H. Johnson, J. Walter Thompson Co offered some figures which could foretell a jump in residential electric sales from $3.2 billion in 1955 to nearly $5 billion in 1966. Americans must increase their standard of living by 50% during the next 10 years to keep up with expanding productive ability, he said. "This means upping consumer sales from a present $260 billion to $390 billion."

S & SHORTS

New Cooking Mailers

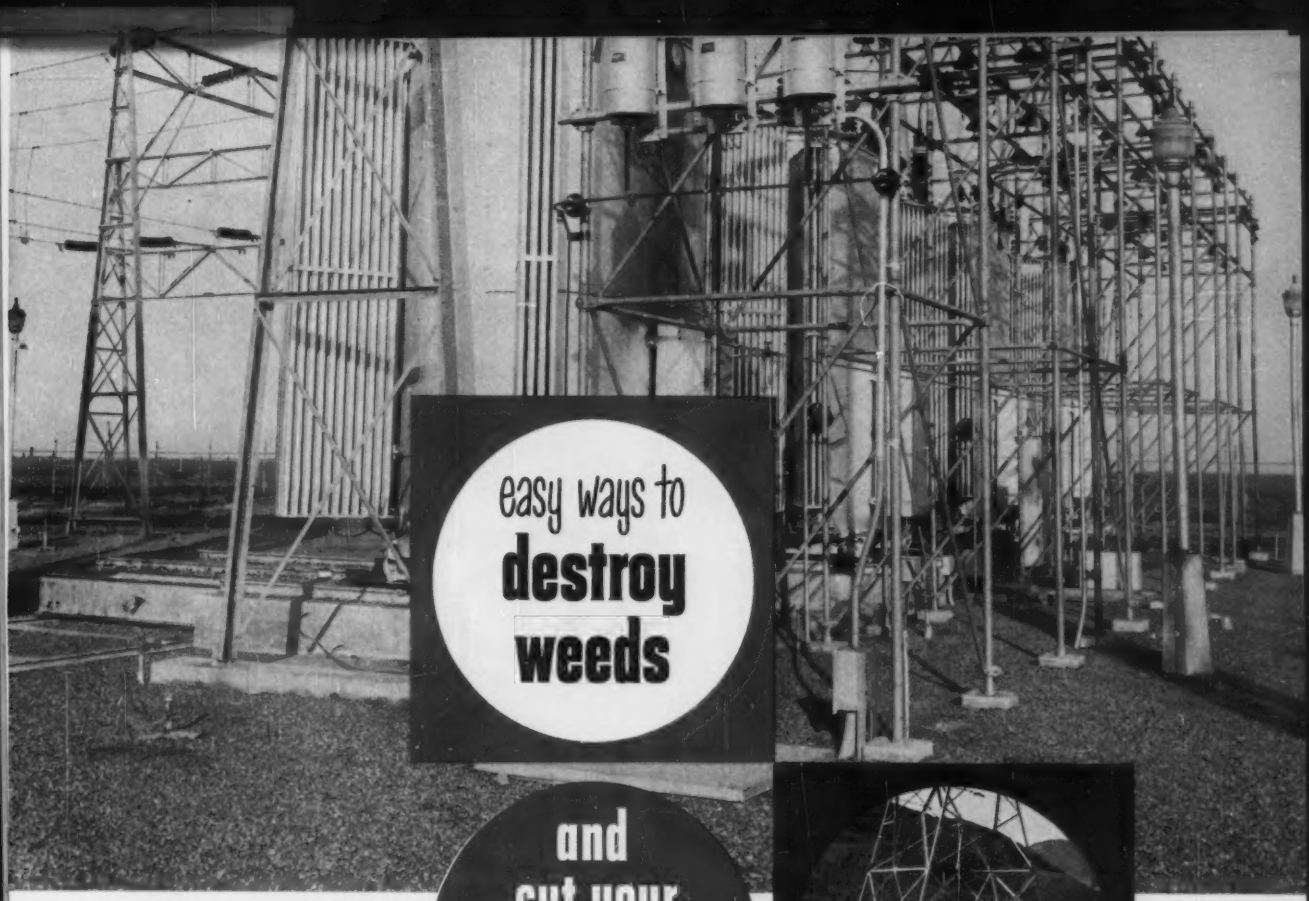
Series of four new two-color direct mail pieces promoting commercial electric cooking have been released by Edison Electric Institute. First one plugs electric steam cooking. The remaining three cover heavy duty equipment, fry kettles, and electric cooking generally. Get samples from EEI's Commercial Department, 420 Lexington Ave, New York 17, N. Y.

Gives Wiring Subsidy

Customers with 30-amp service entrances who buy a range or water heater in New Jersey Power & Light Co campaign get $20 installation subsidy where change is made to 60-amp, No. 4 wire min and $35 for change to 100-amp, No. 2 wire min. If they buy both appliances and install 100-amp service they receive $60.

Sales Aid for Outdoor Lighting

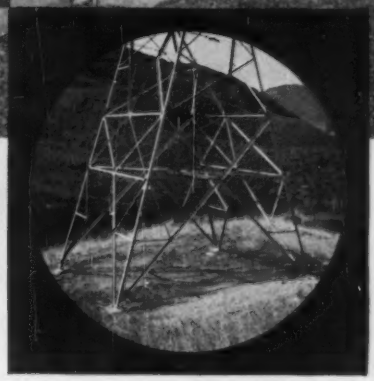
To help utilities sell the outdoor residential lighting market, General Electric Co is offering a merchandising kit designed specifically to plug outdoor lighting fixtures and equipment. Package includes point-of-sale and publicity materials, side-film, TV film commercials, equipment manufacturers catalog, and separate handbooks for the lighting designer and do-it-yourself addict. Distribution of kit will be through GE sales offices.



easy ways to destroy weeds

and cut your maintenance costs!

You can make all your grounds as bare of unsightly and fire-hazardous weeds as these are now . . . at lowest cost . . . by using non-selective Ureabor or Polybor-Chlorate weed killers.



UREABOR®—If you want the ease and convenience of DRY applications, choose this weed and grass killer. UREABOR is a concentrated chemical—just 1 to 2 lbs. per 100 sq. ft. is effective—yet it's completely safe to use anywhere. One application destroys vegetation—prevents regrowth for a season, or so. A special spreader is available for only $10.75 delivered—anywhere in the U.S.A.

POLYBOR-CHLORATE®—Suitable for use in your spraying equipment because it's completely soluble in water. Affects all forms of vegetation. Safely combines the plant-destroying qualities of borates and sodium chlorate with no fire hazard. Quickly kills top-growth and destroys roots—residual effects may prevent regrowth for two years. Recommended especially for use in low-rainfall areas.

PACIFIC COAST BORAX CO.

DIVISION OF BORAX CONSOLIDATED, LIMITED

MANUFACTURERS OF FAMOUS "20 MULE TEAM" PACKAGE PRODUCTS

Mail this coupon!

PACIFIC COAST BORAX CO. E.W.
Division of Borax Consolidated, Limited
630 Shatto Place, Los Angeles 5, California

Please send me full information regarding your
☐ Ureabor weed killer ☐ Polybor-Chlorate weed killer.

Company_____

Name_____ Title_____

Address_____

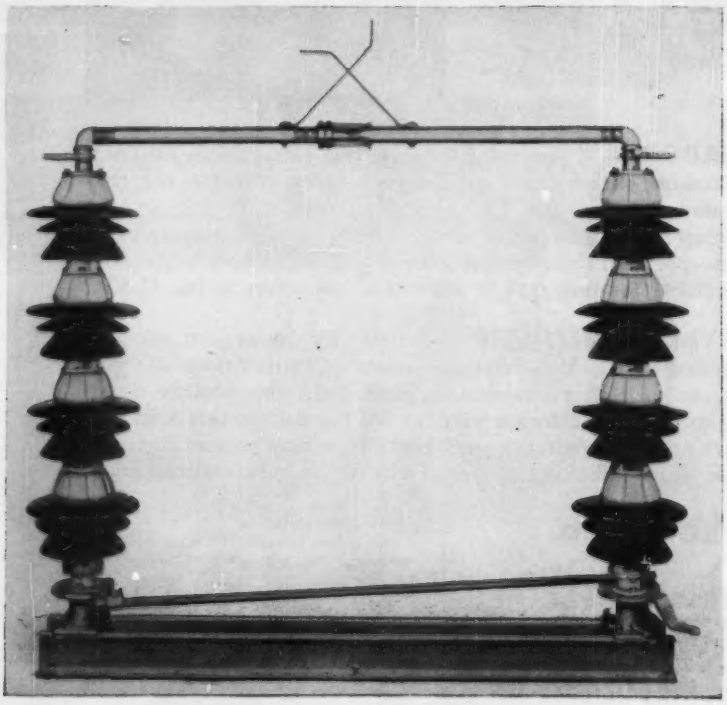
City & State_____

Tank Lifter

Time and labor reductions are claimed for this hydraulically operated tank lifter. Consisting of two cylinders containing pistons and a flexible hose with quick-disconnect couplings, the device raises and lowers oil-filled tanks of frame-mounted, outdoor oil circuit breakers, requiring 40 sec for either direction.

Lifter can be operated from manufacturer's "Pneu-Draulic" operator of the breaker, or from piston-type pump powered by 6-v battery. Portable battery unit weighs 85 lb and can raise and lower tank 60 times without recharging. Control is by two manually operated needle valves. An orifice in each cylinder limits speed.

Allis-Chalmers Mfg Co, Milwaukee 1, Wisc.



Center-Break Switch

A type "C" center-break switch features braidless, sealed, silver-to-silver hinge and high-pressure silver-to-copper jaw contacts. Blade is of hard-drawn copper and has bronze guide at jaw end. Crank arms reportedly permit adjustment within 2½ deg of any position. Opening, closing actions provide ice-breaking ability.

Obtainable for upright, vertical or underhung mounting, switch comes in 600 amp, 46 through 161 kv, and 1,200 amp, 46 through 161 kv ratings.

A. B. Chance Co, Centralia, Mo.

(*More New Equipment on page* 172)

ANOTHER REASON WHY UTILITIES EXPECT MORE FROM

POWERS *American*

Setting the pace...

Pole-Master®

HYDRAULIC DERRICKS

3 MODELS... 7 SIZES

You just can't beat the cost-cutting convenience of Pole-Master. At the flick of a lever, powerful hydraulic cylinders move the derrick to the position that's *exactly* right for the hoisting job. There's no exposed mechanism. Head sheave can be threaded from the ground.

When it comes to capacity, Pole-Master equals or surpasses conventional derricks of comparable rating. It stows *above* the body... never obstructs valuable cargo area space.

Aren't these the features you've long wanted in a derrick for your job?

The powerful Series PM-2 Pole-Master, shown above on a Powers-American Series 800-C Line Body, is available in sizes for handling 40′, 55′, and 70′ poles.

DESCRIPTIVE LITERATURE ...plus complete price information IS YOURS FOR THE ASKING!

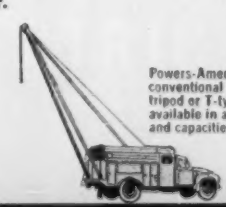
McCABE-POWERS

AUTO BODY COMPANY

5900 NO. BROADWAY • ST. LOUIS 15, MO. **625 CEDAR ST. • BERKELEY 10, CALIF.**

Series HD-2 Pole-Master Derricks can be furnished in sizes for handling 40′ and 55′ poles.

The Series HD-4 Pole-Master, actuated by four hydraulic cylinders, handles 55′ and 70′ poles.



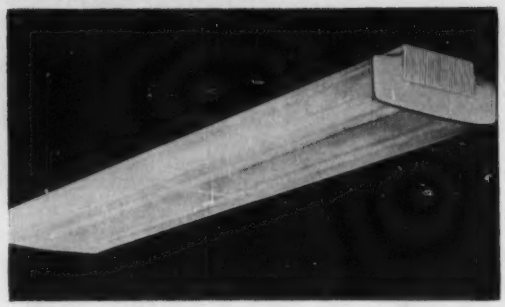
Powers-American conventional derricks, tripod or T-type, are available in all sizes and capacities.

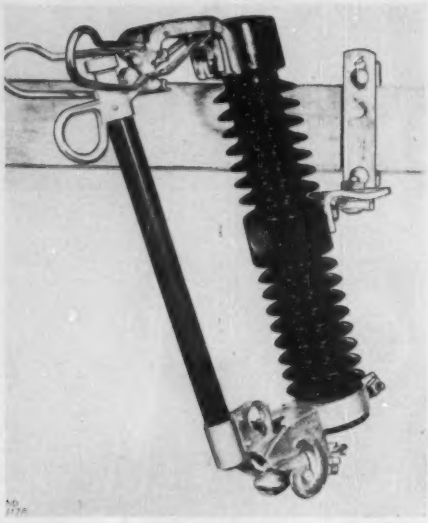
Fluorescent Luminaire

Featuring a prismatic enclosure, this twin-tube luminaire comes in 4 and 8-ft lengths. Enclosure is a molded element which reportedly provides high level of downward, glareless light and indirect component along ceiling.

The Realite unit can be installed in sections by mounting straps. It is also available with pendant hangers. Literature can be had on request.

Holophane Co, Inc, 342 Madison Ave, New York 17, N. Y.





27-Kv, Open Fuse Cutout

Designed principally for use in 14.4/24.9-kv grounded wye systems, manufacturer's 27-kv, 100-amp open fuse cutout is an addition to its HDO line. Unit is offered with normal-duty fuse cartridge with solid cap for single-vented operation, or heavy-duty expendable cap for controlled double-vented operation.

Interrupting capacity is 1,200 amp (solid cap) or 4,000 amp (expendable cap). Also available is load-break device permitting link-breaking action for all links up to 100 amp. Featuring silver-plated contacts, collapsible hinge for drop-down and hinge shunt contact, the cutout has single insulator support.

Line Material Co, Milwaukee 1, Wisc.

Trenching Machine

A geared spacer—with all gears running in oil—is a feature of this trencher. Inserted behind tractor transmission, the spacer is said to lengthen wheelbase 6 in., put weight on front wheels, and provide smooth digging and straight trenches.

An hydraulic drive provides propulsion power while reportedly digging up to 600 ft/hr, depending on soil. Hydraulic boom lift operates digging boom in 190 deg arc by means of one control lever.

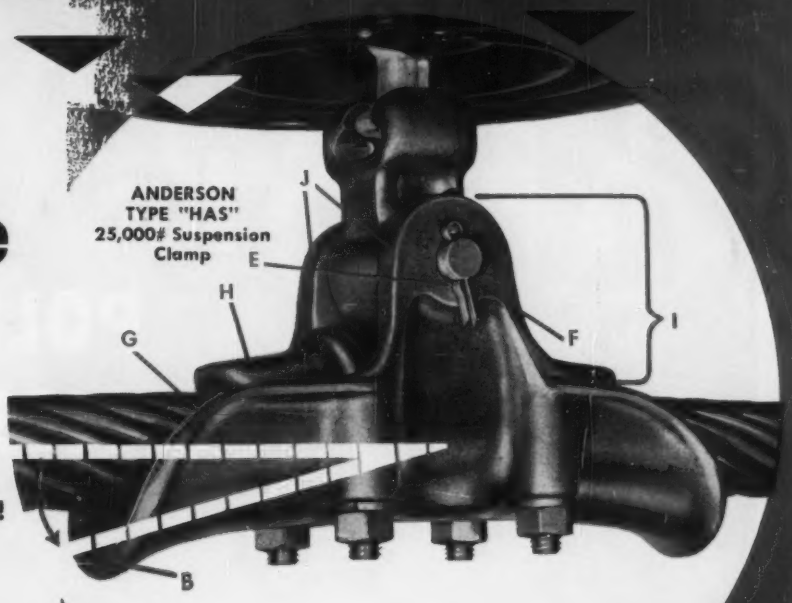
Rated digging capacity is 6-14-in. wide and up to 6-ft deep. Weight is about 1,850 lb. Mounting method has been accepted by tractor manufacturer, International Harvester Co.

Auburn Machine Works, Inc, Auburn, Nebr.

(*More New Equipment on page* 176)

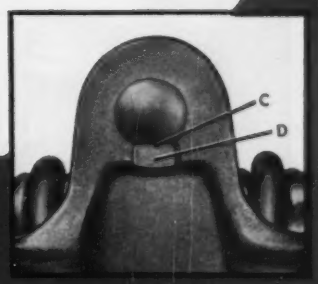
New SUSPENSION CLAMP

...the result of a nation-wide utilities survey



POWER LOSS PRACTICALLY ELIMINATED!

Deep, flared cable groove at mouth with extra built-in strength provides for *dual use* . . . suspension as well as angle pull-off! Turning angles on all sizes permit widest range of conductor sags. Light weight to reduce conductor damage.



Note carefully the specific features engineered into these newly developed Anderson Suspension Clamps:

(A) Correct conductor approach angle with keeper and bottom of groove... prevents crystallizing damage due to conductor vibration.
(B) Shape of mouth flare provides proper approach angle with the sides of clamp . . . for wide range of sagging tensions.
(C) & (D) Anti-rotation lug, with seat . . . prevents wear in the aluminum clamp ears.
(E) & (F) "Humped" speed cotter key remains tight in clevis pin hole . . . preventing wear and reducing Radio and TV interference.
(G) Minimum clearance between conductor and clamp . . . increases protection of conductor.
(H) Non-ferrous keeper . . . prevents electrolysis and further reduces power loss.
Short clamp ears . . . reduce overall assembly length and allow damaging vibration to pass through.
(J) Heavy ear section.

HAS*. . . TYPE AND SIZES

Catalog Number	Clamping Range Min.	Clamping Range Max.	Ultimate Strength in Lbs.
HAS-85-S	.40	.85	17,000
HAS-104-S	.50	1.04	25,000
HAS-118-S	.70	1.18	25,000
HAS-129-S	.90	1.29	25,000
HAS-139-S	.90	1.39	25,000
HAS-147-S	1.00	1.47	25,000
HAS-162-S	1.10	1.62	25,000
HAS-182-S	1.25	1.82	25,000
HAS-204-S	1.40	2.04	25,000
HAS-227-S	1.75	2.27	25,000
HAS-252-S	2.00	2.52	25,000
HAS- 52-16S	2.00	2.52	30,000

*Available through insulator manufacturers

ADEQUATE WIRING SERVES AND SAVES

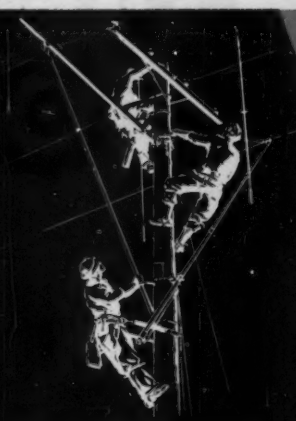
For complete information consult your nearest ANDERSON representative

Aluminum & Bronze POWER CONNECTORS • CLAMPS • FITTINGS • ACCESSORIES
for SUBSTATION • TRANSMISSION • DISTRIBUTION

ANDERSON ELECTRIC CORPORATION

P. O. DRAWER 2127 • BIRMINGHAM 7, ALABAMA

Formerly Anderson Brass Works, Inc.



Reduce installation WITH KEARNEY POLE LINE ACCESSORIES

They're field proved... and manufactured under rigid production quality controls

LAY-CIT CABLE GRIP for aerial and service cable

Double-gripping action . . . extra holding power! As conductor tension increases, laced bail design of grip evenly distributes increase in holding pressure, thus preventing damage to insulation from slippage.

Conveniently installed, even on long runs, and easily salvaged for re-use.

installation is quick and easy... here's how...

First, spread plates far enough apart for proper fitting around cable being used.

Place bottom bail in position, then lace through hooks of bottom and top plates—keeping plates one above the other.

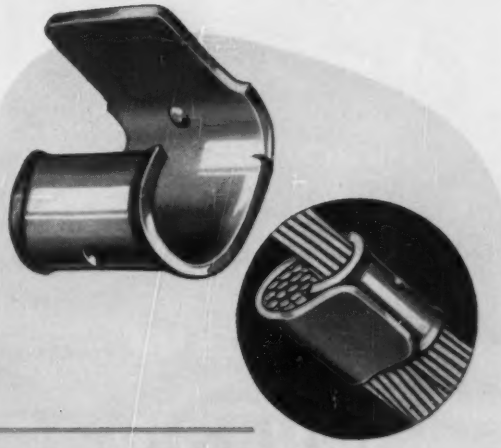
Next, adjust grip to fit cable by spreading plates apart so one plate rests on top, other on bottom, of cable.

With lacing in place, pull up bail snugly . . . notice how plates take grip, settle into position.

JAMES R. KEARNEY CORPORATION

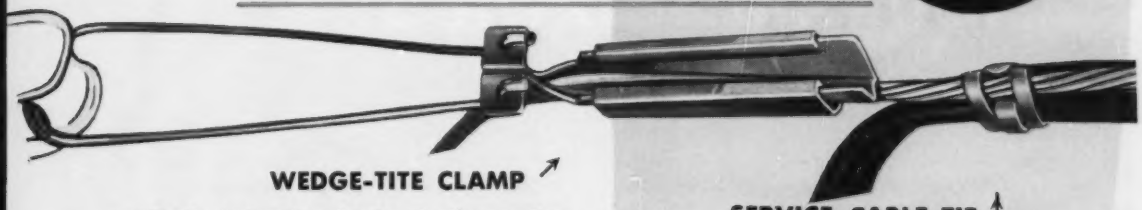
4224-42 Clayton Avenue, St. Louis 10, Missouri • *Canadian Plant:* Guelph, Ontario

time and costs...



GUY WIRE CLIP →

...enables you to serve end strands in less than one-fourth the time needed in using waste strand. KEARNEY Guy Wire Clips will not damage strand galvanizing... can be installed with pliers.



WEDGE-TITE CLAMP ↗

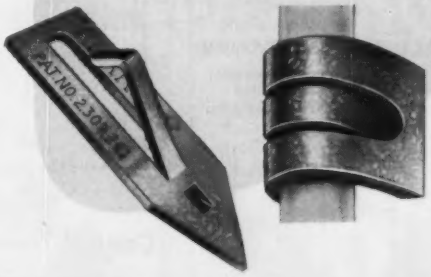
...specifically designed to dead end self-supporting type of service cable. Self-contained serrated wedge in clamp grips the bare wire with force proportional to strain put upon it. Since this strain is not transmitted to the insulated conductors, *insulation creep*—with its dangers of leakage and shorts—*is prevented*. One-piece construction... easily installed.

SERVICE CABLE TIE ↑

...secures insulated wires to bare neutral, preventing separation of conductors. For use with Triplex type cable on secondaries or services. Soft aluminum, easily installed with fingers.

NON-STATIC GROUND WIRE CLIP →

...as clip is driven, the hook automatically, *permanently* grips the wire. The high pressure contact it maintains prevents trouble-causing air gaps... eliminates a major source of radio and tv interference.



-319

for BETTER CONSTRUCTION
SAFER MAINTENANCE
Specify
JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. EUCLID, ONT.
The Mark of Quality
KEARNEY PRODUCTS

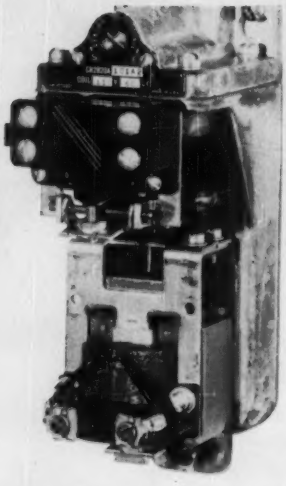
read all about it!
SEND TODAY FOR YOUR COPY OF THE NEW CATALOG ON
HOLAN'S 4401-H HYDRAULIC DIGGER
• New catalog shows how easy hydraulic hole-digging can be. No vibration to jar the operator . . . no complicated mechanical linkages that require maintenance . . . no damage due to stalling. Holan 4401-H digs holes 8" to 20" wide . . . 8' deep.

J.H. HOLAN CORPORATION
4100 WEST 150TH STREET
CLEVELAND 11, OHIO
OTHER PLANTS: GRIFFIN, GA.; PHOENIX, ARIZONA; BRANTFORD, ONTARIO

To: J. H. Holan Corporation
4100 West 150th Street
Cleveland 11, Ohio

Please send me the factual technical bulletin about Holan's 4401-H Portable Hydraulic Earth Borer.

Name____ Title____
Address____
City____ Zone____ State____

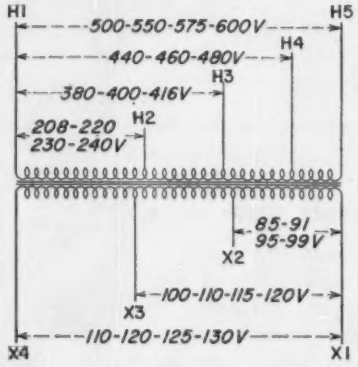


Pneumatic Timer

This pneumatic timer is designed for use in automatic control circuits like machine tool sequencing, process industry operations, cranes, and conveyor lines. It has a time delay of 1/5 to 180 seconds with reported accuracy of plus or minus 10% of setting.

Timer operation can be changed from on-delay to off-delay with a screwdriver. It will operate at standard voltages and frequencies.

General Electric Co, Schenectady 5, N. Y.



Control Transformers

This diagram illustrates the connection for voltage condition that manufacturer's series of control transformers handle for off-standard voltage applications. The transformers, available in capacities of 50, 150, 250 and 500 va, are said to meet nominal performance requirements under high or low voltage situations.

(*Continued on page* 178)

read all about it!
HOLAN
ALL-HYDRAULIC LADDER
The last word in ladders. Every movement of Holan's 2100 Ladder is controlled hydraulically. It rotates 360° . . . reaches up to 40 feet in the air . . . elevates to a 75° elevation.
Write for the new 2100 catalog for technical information

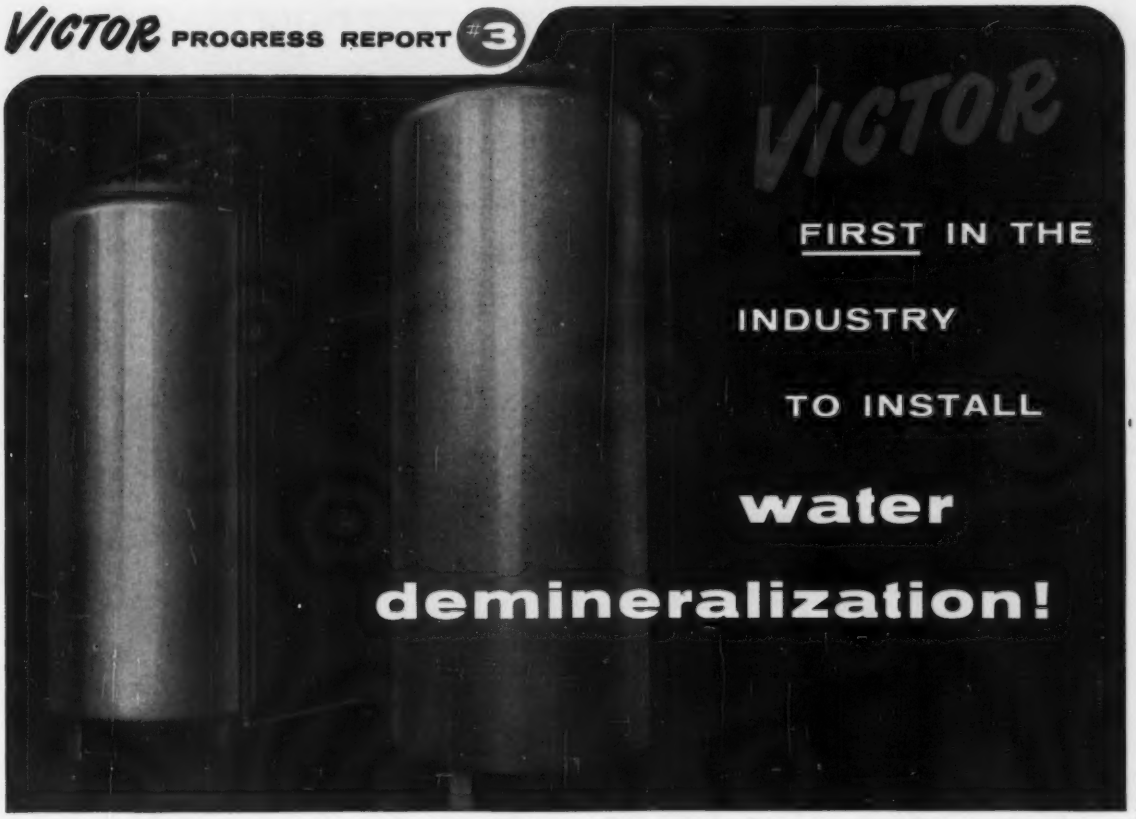
J.H. HOLAN CORPORATION
4100 WEST 150TH STREET
CLEVELAND 11, OHIO
OTHER PLANTS: GRIFFIN, GA.; PHOENIX, ARIZONA; BRANTFORD, ONTARIO

To: J. H. Holan Corporation
4100 West 150th Street
Cleveland 11, Ohio

Please send me the factual technical bulletin about Holan's 2100 Hydraulic Ladder.

Name____ Title____
Address____
City____ Zone____ State____

VICTOR PROGRESS REPORT #3



Victor's extensive ceramic research first brought to light the fact that minerals in processing water cause microscopic agglomerates of glass-like impurities which result in fluctuations in insulator characteristics. As a result, Victor was the *first* porcelain insulator manufacturer to install water demineralization equipment, part of which is shown above. For several years, *all* processing water used in Victor's plant has been demineralized.

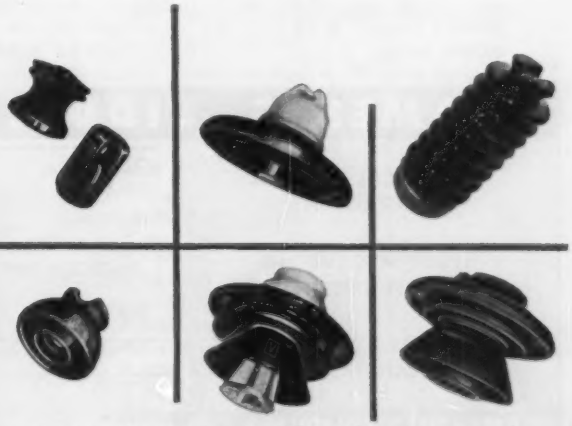
Exhaustive tests have proved that Victor *Purified* Porcelain Insulators, made with demineralized water, have: (1) improved thermal resistance; (2) unmatched porcelain hardness and density; (3) higher average puncture values, and (4) better tension, torsion, cantilever and impact values.

Another example of Victor's ability to give you better insulators through research and modern manufacturing facilities.

SPECIFY VICTOR
Purified Porcelain
Insulators!

VICTOR INSULATORS DIVISION
I-T-E CIRCUIT BREAKER CO.
VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains
Spools • Switch and Bus Insulators • Custom Designed Porcelain
Insulator Hardware



"BETTER INSULATORS THROUGH RESEARCH"

BIDDLE CORONA TESTING EQUIPMENT

For Non-Destructive Evaluation of Electrical Insulation in Transformers, Cables, Capacitors and Other Electrical Components

for ionization starting voltage at 60 cycles

Ionization, corona and radio noise are synonymous in describing the phenomena which occurs when a high voltage gradient applied to voids in a dielectric causes ionization of the gas in those voids. The result is electrical disturbance and possible damage to insulation. The Biddle ionization test set offers a decided advantage in practical testing in that it makes possible the grounding of one terminal of the component under test.

The set includes all necessary connecting leads and accessory mercury oil terminal for use in testing samples of shielded cable. Model I rating ¾ KVA at 20 KV. Also available with 5 KVA intermittent rating. Write for BULLETIN 66-W.

JAMES G. BIDDLE CO.

ELECTRICAL TESTING INSTRUMENTS
•
SPEED MEASURING INSTRUMENTS
•
LABORATORY & SCIENTIFIC EQUIPMENT

1316 ARCH STREET, PHILADELPHIA 7, PA.

James G. Biddle Co. B-510
1316 Arch St., Phila. 7, Pa.
Gentlemen,
Please send me:
☐ BULLETIN 66-W.

NAME

JOB FUNCTION

COMPANY

ADDRESS

Control Transformers

(*Continued from page* 176)

The series has five primary and four secondary taps. Manufacturer reports control transformers will supply requirements for average push-button or automatic control installation under off-standard condition.

Acme Electric Corp, Cuba, N. Y.

Faultfinder

Described as combination ground detector and fault locator, this faultfinder is designed for use on normally ungrounded power circuits while circuits are energized. Manufacturer states its main application is in plants having several distribution centers.

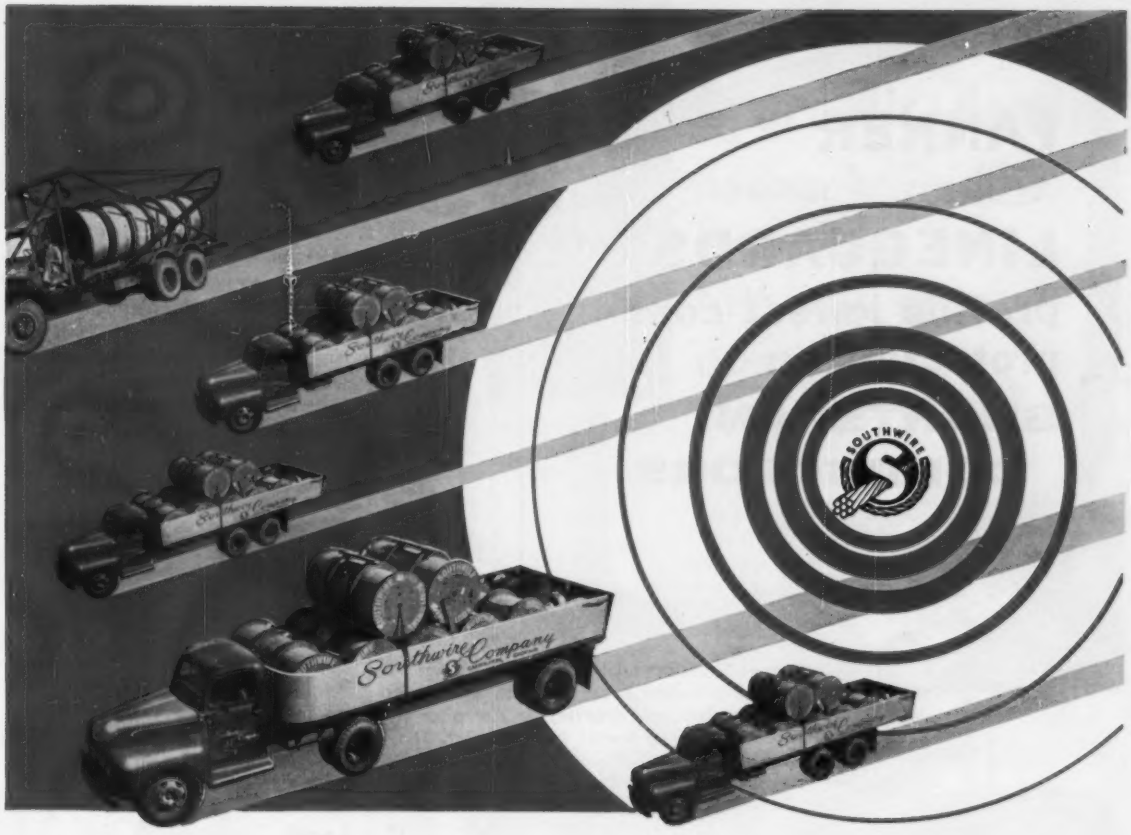
Designated Model No. 58, the faultfinder can be used on voltages from 120 to 600. It is 15 x 8 x 7 in. and weighs 27 lb. Usage for the instrument is claimed on circuits buried in earth or concrete, or on overhead circuits, without necessity of an exploring coil on conduits or cables.

Parr Mfg Corp, 48 Hale St, Cranford, N. J.

Motor Control Centers

A line of motor control centers is designed to provide space-saving advantages up to 5 hp max for applications in industry, laboratories, institutions and commercial enterprises. The units are 7-in. high and are said to permit 10-high mounting in a 90-in. section. Up to 20 NEMA No. 1 starters can thus be plugged into 90-in. high, back-to-back section.

(*Continued on page* 180)



Southwire Trucks Make 1089 Trips and Cover 2 Million Miles a Year

To provide service on a par with Southwire quality

We learned a long time ago that, in this business, to win customers and keep them, service must be on a par with the quality of products. That's why Southwire operates its own fleet of modern trucks over a vast network—from Minnesota to Florida, from Pennsylvania to Texas. It is your positive assurance of dependable deliveries—direct to your warehouse or job site.

Southwire products are produced in our own modern plant to meet the most exacting requirements and specifications. Their quality is controlled from start to finish, checked and re-checked every step of the way, to give you the best.

Next time order Southwire products and get Southwire service automatically.

SOUTHWIRE PRODUCTS

- Bare and Weatherproof Copper and Aluminum Line Wire
- Neoprene Weatherproof Copper, Aluminum and Triplex
- Polyethylene Weatherproof Copper, Aluminum and Triplex
- Southwire Vinyl Weatherproof Copper, Aluminum and Triplex
- Copperweld® Conductors
- Copper and Aluminum Building Wire
- ACSR and All Aluminum Cable
- Steel Guy Strand and Static Wire
- Aluminum Alloy Wire
- Cable Accessories

Southwire Company

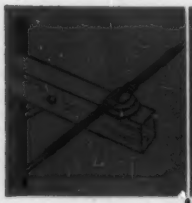
Carrollton, Georgia • Terrace 2-6311

FANNER *Superformed* LINEGUARDS provide lowest cost protection on SHORTSPAN CONDUCTORS

Fanner Superformed LINEGUARDS give short span distribution lines complete protection against abrasion, arcover, or clamp or tie wire damage at lowest possible cost. They have the same features of ease of installation, lasting durability and reuseability as Fanner ARMOR RODS, but are smaller in wire size and shorter, therefore cost far less: It's good economy to use Fanner LINEGUARDS on short spans with low tensions (1) at support points to protect against clamp or tie wire damage, (2) to provide a protective layer for tapping purposes, (3) at expulsion-gap or other critical locations. Further information and prices on FANNER Superformed Lineguards will be furnished on request. Write today.

Other FANNER ELECTRICAL LINE PRODUCTS

ARMOR RODS



- For protection against vibration damage and also good for emergency repairs on partially broken overhead lines.

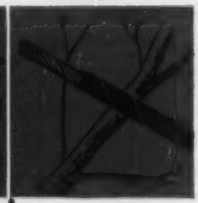
PATCH RODS

- Act as a "repair sleeve" for conductors having up to about ¼ of the wires broken in the outer layer.

TAP ARMOR

- Provides a protective layer of shortened rods on conductor for making taps without risking damage to conductor.

PLASTIC FANNGUARDS



- Tough, durable spiral wound plastic sleeves that snap together over covered wires and cables to provide protection against tree abrasion.

Licensed for use under Patent No. 2,275,019

THE FANNER MANUFACTURING CO.

Electrical Products Division

Brookside Park Established 1894 Cleveland 9, Ohio

Fine Fanner Superformed

AGENTS AND DISTRIBUTORS IN PRINCIPAL CITIES

Control Centers

(*Continued from page* 178)

Units have Class A, B or C wiring: A with line connections from bus to breaker, from breaker to line starter only; B has A features and individual terminal blocks in each starter; C incorporates unit to master terminal block at top or bottom of vertical sections and interconnections between starter and master terminal boards. Units may be mounted with 14-in. and larger modules for motor controls ranging from fractional to 100 hp.
Federal Pacific Electric Co, Eastern Switchgear Division, Scranton, Pa.

Load Center Line

A complete line of load centers from 2 to 42 circuits features a "QO" panelboard breaker. Not being interchangeable, this breaker reportedly discourages substitution of 30, 40 or 50-amp breakers where 15 or 20-amp devices were originally installed. The "QO" is said to incorporate quick-made and quick-break, ambient-compensated, thermal-magnetic features.

Flush, surface and raintight devices are available, lugs only, split bus or main breaker types. Two to 8-circuit devices are available without doors; 12, 20, 30 and 42-circuit units with doors. The line meets Federal Specifications WP-131A, Class A.
Square D Co, 6060 Rivard St, Detroit 11, Mich.

Oil Well Pump Control

A controller design that reportedly brings full automation to oil well pumping features a timer that: **1.** Programs pumping operations in 15-min periods (minutes per hour, hours per day and days of operation per

(*Continued on page* 182)

Truco

SAFETY

hydraulic derrick

hydraulic middle leg allows safe, fast, one man operation

Simple hydraulic cylinder in middle leg makes derrick a "live" boom

Disconnect middle leg and derrick becomes hydraulic pole jack

SAFE

SAFE

unique folding mechanism eliminates two-piece, pinned side legs

one man can rapidly erect or fold with one lever control

Exclusive feature makes easy loading of heavy material into rear of body.

SAFE

TRUCK

Write for detailed brochure, specifications and current prices. Find out how safe and fast hydraulic derricks can be

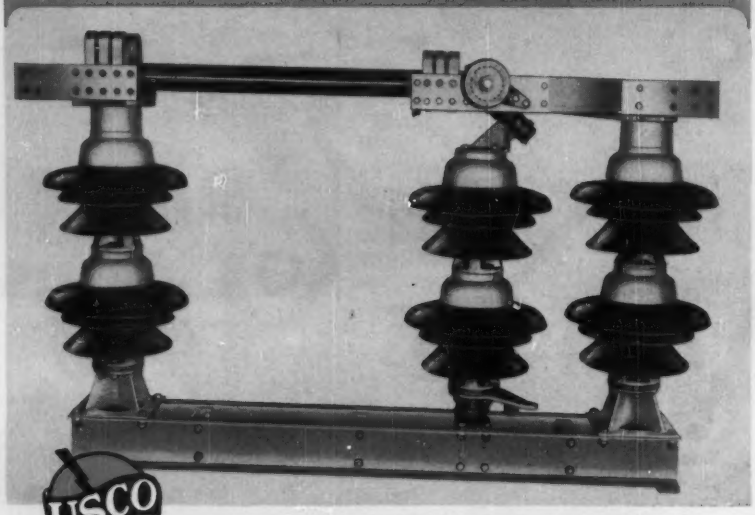
Equipment COMPANY

3963 Walnut Street • Denver 5, Colorado

Manufacturers of Truco Self-Powered Digger and Truco Safety Hydraulic Cable Reel Carrier

USCO TYPE G-45 3 PST SWITCH

Precision engineering design and manufacture kept this high-current switch in excellent condition throughout rugged test



Available 15-69KV, 2000-4000 amperes. Shown is one pole only 69KV, 2000 ampere switch.

Test results show that the G-45 Switch will operate cooler and give maintenance-free operation under all conditions. This switch employs high-pressure contacts in the jaws and hinge. No shunts are used in the construction. Current-transfer materials in the contacts are bus-bar copper and pure, heavy silver. See the official test data to the right . . . compare it with others.

Official Test Results Type G-45

69KV—2000 amperes
79,000 RMS amperes momentary (5 cycle)
47,000 avg. RMS amps, 4-second duration
20° C rise on Heat-run
Available: 15-69KV, 2000-4000 amperes
(69KV, 2000 ampere shown)

All component parts of USCO switches are designed and manufactured in our factory. Your inquiries will receive prompt and courteous attention. For full details write to us today.

USCO Power Equipment Corp.

829 North 36th Way, Birmingham 4, Alabama • Phone LYric 2-7241

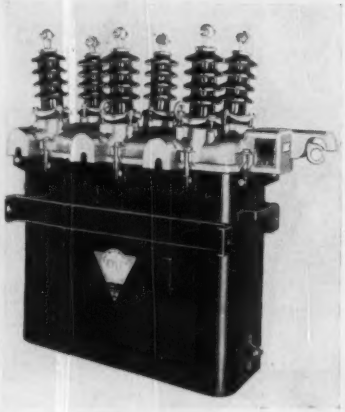
Designers and Manufacturers of High Voltage Electrical Equipment for Utilities, Cooperatives and Industry

Pump Control

(*Continued from page* 180)

week), and **2.** provides 73 controlled restarting intervals in 2½-sec increments from 0 sec to 3 min. The timer is said to permit independent scheduling of pump operations and avoid simultaneous restarting of a number of pumps on the same line. Booklet EL-20 available on request.

Cutler-Hammer, Inc, 235 N. 12th St, Milwaukee, Wisc.



3-Phase Recloser

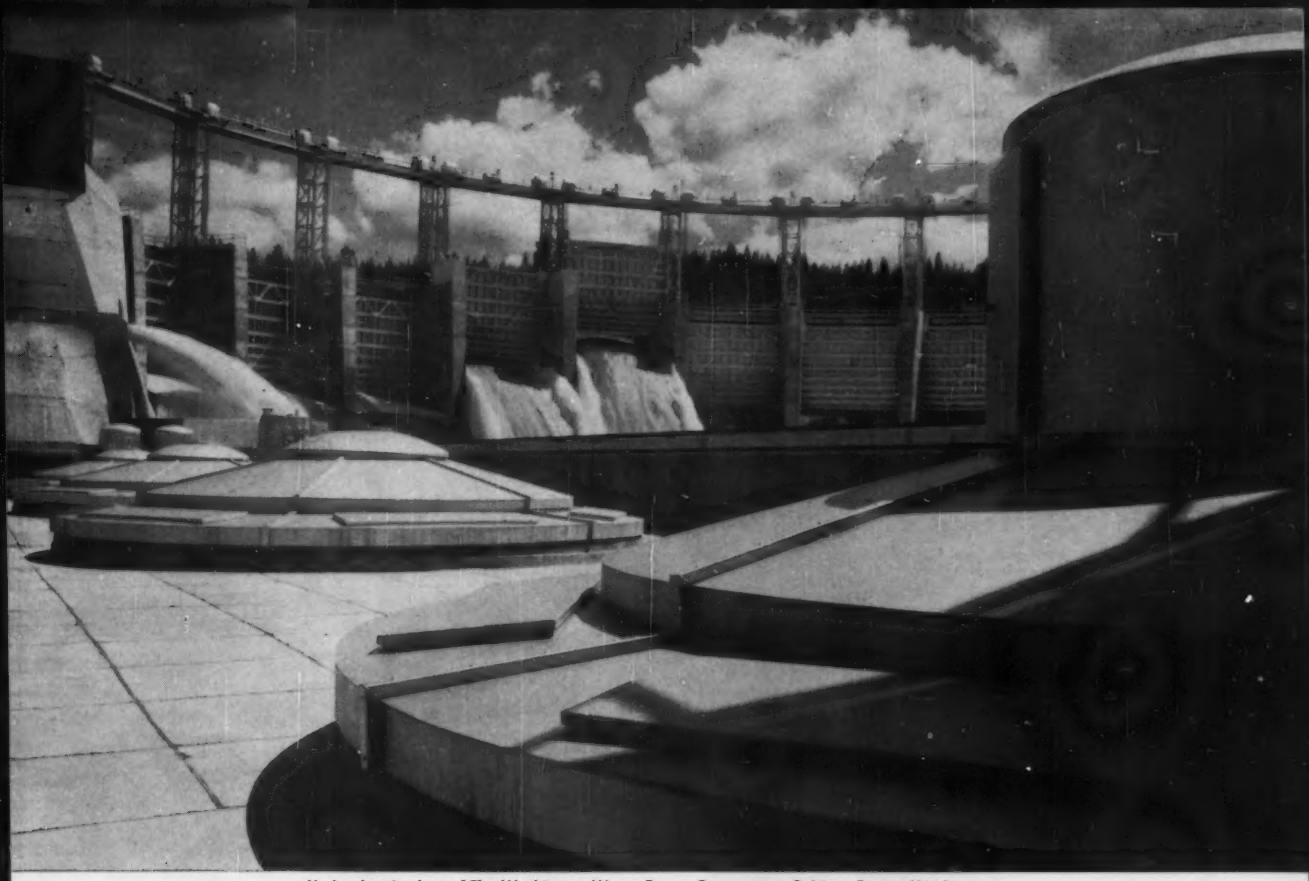
Designed to serve as a 3-phase, intermediate-duty interrupter rated 2.4 to 14.4 kv, this oil circuit recloser is designated Kyle Type 6H. It will supplement manufacturer's standard-duty, distribution class recloser on systems having high load and interrupting capacities.

The 6H is adaptable for poles or substations. Available with load current coil ratings of 5, 10, 15, 25, 35, 50, 70 and 100 amp, it reportedly provides maximum interrupting capability of 3,000 symmetric amp or 4,200 asymmetric amp. 4.8 kv. BIL is 110 kv.

Timing in the 6H is performed by a hydraulic mechanism. For interruption it uses a cross-blast arc-extinguishing device. Manufacturer claims simplified adjustments facilitate field selection of the tripping sequence, operations to lockout, and operating characteristics (fast and/or retarded or extra retarded). Each phase unit trips individually, but lockout of one phase causes lockout of all phases.

Line Material Co, Milwaukee 1, Wisc.

(*More New Equipment on page* 186)



Hydroelectric plant of The Washington Water Power Company at Cabinet Gorge, Washington. This is the highest head installation in the United States using both fixed blade and Kaplan turbines.

282,000 H. P. produced at lowest cost by fixed blade and Kaplan turbine team

In operation at the Cabinet Gorge hydroelectric plant of The Washington Water Power Company are three Baldwin fixed blade propeller turbines and one Baldwin Kaplan turbine.

These unusual 6-blade Baldwin units were designed for a normal head of 90 feet with a rating of 70,500 H.P. each at 120 R.P.M. Under certain conditions, the head reaches 105 feet, which increases total output to over 325,000 H.P. In terms of horsepower capacity, the fixed blade turbines are the largest ever installed in the United States. Each type of turbine has its own inherent advantages, and by using them in proper combination, the Cabinet Gorge plant is able to operate at maximum efficiency on a minimum investment.

All over the world, hydroelectric plants are reaping the benefits of Baldwin's 130 years' experience in designing and building hydraulic power equipment. Since we build all four basic types (Impulse, Kaplan, Francis and Propeller), our engineers can make unbiased recommendations on the type best suited to *your* flow and head requirements. On your next project, call us in early. Write BLH Corporation, Philadelphia 42, Pennsylvania, or Dept. 5207, Pelton Division, 2929 Nineteenth St., San Francisco 10, California.

Inspecting the hub mechanism of the Kaplan turbine.

BALDWIN BLH LIMA-HAMILTON

EDDYSTONE DIVISION
BALDWIN-LIMA-HAMILTON

DIVISIONS: Austin-Western • Electronics & Instrumentation • Hamilton • Lima • Loewy-Hydropress • Madsen • Pelton • Standard Steel Works

"When you're as old as me, sonny,
this meter will still be working!"

Tom Barnes, Mgr. Meter Engineering, Says:
"WE ARE CERTAIN THAT LOAD GROWTH WILL NEVER MAKE THIS METER OBSOLETE."

The New Westinghouse 30-Ampere Meter

Good news! For only pennies a year over the cost of ordinary meters, you can buy the new 30-ampere Westinghouse Lifetime Meter. It's good insurance against load-growth problems. This new meter will handle all single-phase loads up to 200 amperes.

Few homes *today* require 200-ampere meters. But how about the future? Industry forecasts predict a tremendous growth in the use of electric power, particularly in the home.

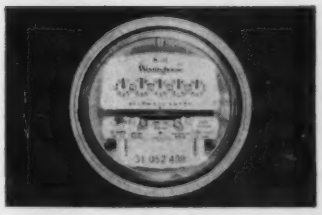
The 30-ampere meter gives you a substantial cushion against this future load growth. It is your guarantee that whatever the future, your meters will have the capacity to handle the load.

In most localities, testing requirements are the same as for 15-ampere meters. For only a little more, you get twice the metering capacity when you specify 30-ampere Lifetime Meters.

For more information, see your Westinghouse sales engineer or write Westinghouse Electric Corporation, 3 Gateway Center, P.O. Box 868, Pittsburgh 30, Pa.

J-40489

New 30-ampere meter gives you all the Lifetime features



10,000-volt impulse insulation level in current and potential coils. De-ion® gap discharges outside the meter at 6500-volt impulse for lightning protection. Corrosion resistance in all components. Full and light-load adjusters are linear, 20% range, accessible from the front.

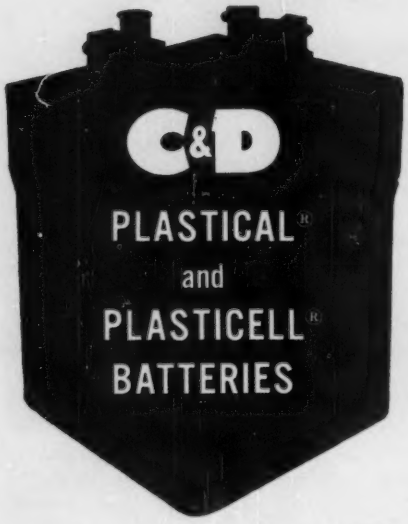
Alnico damping magnets for extreme stability. Famous Westinghouse ball-and-jewel bearing, a proved Lifetime bearing.

WATCH WESTINGHOUSE

*WHERE THE **FUTURE** IS **ALREADY** IN PRODUCTION!*

Now—"engineered" power

for switchgear-control —emergency lighting —auxiliary power



Compact, modern-design "power plants" engineered for specific applications!
C & D PlastiCals and PlastiCells give you completely dependable power—
where power must not fail!

PlastiCal—with lead-calcium grids for maximum life—is conservatively engineered for at least 25 years in full-float service. PlastiCell—with high-tensile alloy grids—has a projected life of 14 years in float service.

WITH BOTH PLASTICAL AND PLASTICELL YOU GET SUCH ADVANCED C & D DESIGN EXTRAS AS:

1. Extra-long life—exclusive design combines advantages of both suspended and supported plate construction.
2. Triple insulation—thick Fiberglas mat, microporous separators, and perforated Koroseal retainer.
3. Saftee-Vent—outstanding C & D development that prevents accidental battery explosions.
4. Crystal-clear plastic jars—heat-resistant and hermetically sealed.
5. Plastite Post Seals—for easier maintenance, and at the lowest lifetime cost.

Write for C & D Specification Bulletins:
CP-536 Rev. 1 on PlastiCal Batteries
CP-537 Rev. 1 on PlastiCell Batteries

C&D BATTERIES, INC.
of Conshohocken, Pa.
Industrial Batteries since 1906

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST

Limit Switch

Features of this externally adjustable limit switch are said to make more current capacity obtainable from manufacturer's single-phase step voltage regulators. Knobs on the position indicator's side reportedly permit independent setting of raise and lower voltage limits without interrupting service.

When full-range regulation isn't needed, narrow settings allow regulator to carry current up to 160% of rating, the maker reports. The position indicator and limit switch will be supplied on all of the manufacturer's ML32 regulators.

General Electric Co, Schenectady 5, N. Y.

Motors

Two lines—shaded-pole and permanent-split capacitor—of 42-frame fractional horsepower motors are said to be applicable to room air conditioners, unit heaters and coolers, furnace blowers and window fans.

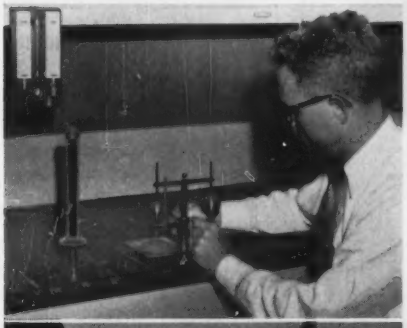
The shaded-pole type is a constant speed, switchless motor rated 1/30 to ⅛ hp on 115 or 230 v, 60 cycles, at 1,050 rpm. The permanent-split

(*Continued on page* 188)

the clue to LONGEVITY!

Rip Van Winkle, the story book character, lived to a ripe old age —— and here our comparison ends, for though Rip slept through most of his lifetime, PORCELAIN PRODUCTS Insulators achieve longevity only by *wide awake* analytical research and rigid factory engineered test methods — OUR CLUE TO LONGEVITY, and your guarantee of a product that will outlast even old Rip.

EEI-NEMA
CLASS 52-3
PP 66255



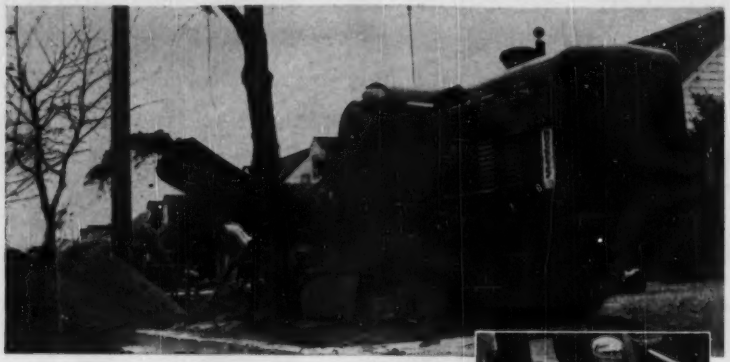
To guarantee maximum cement strength and conform with standards derived by analytical research, Porcelain Products' lab technicians subject all incoming cements and production mixes to exhaustive batch control tests such as the Gilmore Needle Test shown here. This particular test is used to determine the time of setting of cement, which insures consistency in production and gives the ultimate cement strength necessary for insulator assemblies - and is but one of such tests employed to guarantee product performance.

The 10" suspension insulators shown here were installed on the Boulder Canyon Project over 20 years ago — tangible proof of PRODUCT RELIABILITY — and LONGEVITY.

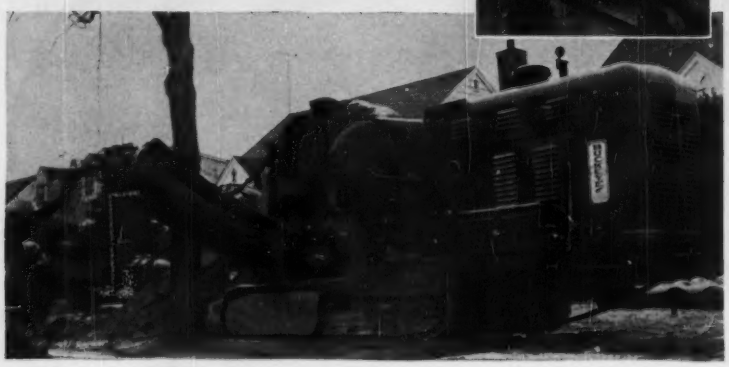
PP
INC.

Porcelain Products, Inc.
High Voltage Division **Parkersburg, W. Va.**

Push-Button Conveyor Shift Speeds Ditching with the 407



To clear obstructions, just push a button... conveyor shifts while you keep digging!



Instant conveyor shifting by push-button control is a big Gar Wood-Buckeye Model 407 advantage for utility work. It means faster, easier nonstop work in close quarters and around obstructions. Only Gar Wood-Buckeye has it!

And, only Gar Wood-Buckeye gives you these other important operating advantages: Speeds you can find and use . . . one selector lever plus high-low range lever makes changing speeds easy. Independent lever steering that is positive and reliable. Instant control of live hydraulic boom with positive down-pressure.

In every way, the 407 is far easier to operate, control and adjust than any other ditcher in its class. No wonder it has become the standard for utility work, as well as the world's largest selling ladder-type ditcher! See your Gar Wood-Buckeye dealer, or write direct to: Customer Service Department, Gar Wood Industries, Inc., Wayne, Michigan.

GAR WOOD INDUSTRIES, INC.

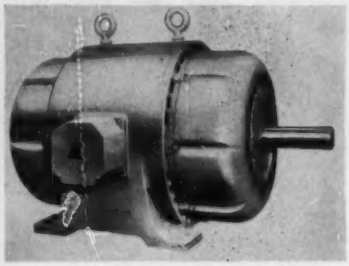
Wayne, Michigan, • Findlay, Ohio

Motors

(*Continued from page* 186)

capacitor, also with constant speed, can serve as a fan drive in room air conditioners. It is rated 1/30 to ¼ hp on 115 or 230 v, 60 cycles, at 1,075 rpm.

Westinghouse Electric Corp, PO Box 2099, Pittsburgh 30, Pa.



Featuring a double-end ventilation system, this totally-enclosed, fan-cooled motor ranges in size from 50 to 200 hp. The design includes two external cooling fans, one at each end, which are said to draw fresh air across each bearing, then drive it the length of the motor through cooling tunnels cast in the main frame's walls.

Delco Products Division, General Motors Corp, Dayton, Ohio.

More New Products

Zane Mfg Co, 20 E. Concord St, Boston, Mass., has **fluorescent light strip** for coves, valances, showcases, and area strip lighting that features end bracket construction serving as end plate and connector for joining fixtures in continuous rows.

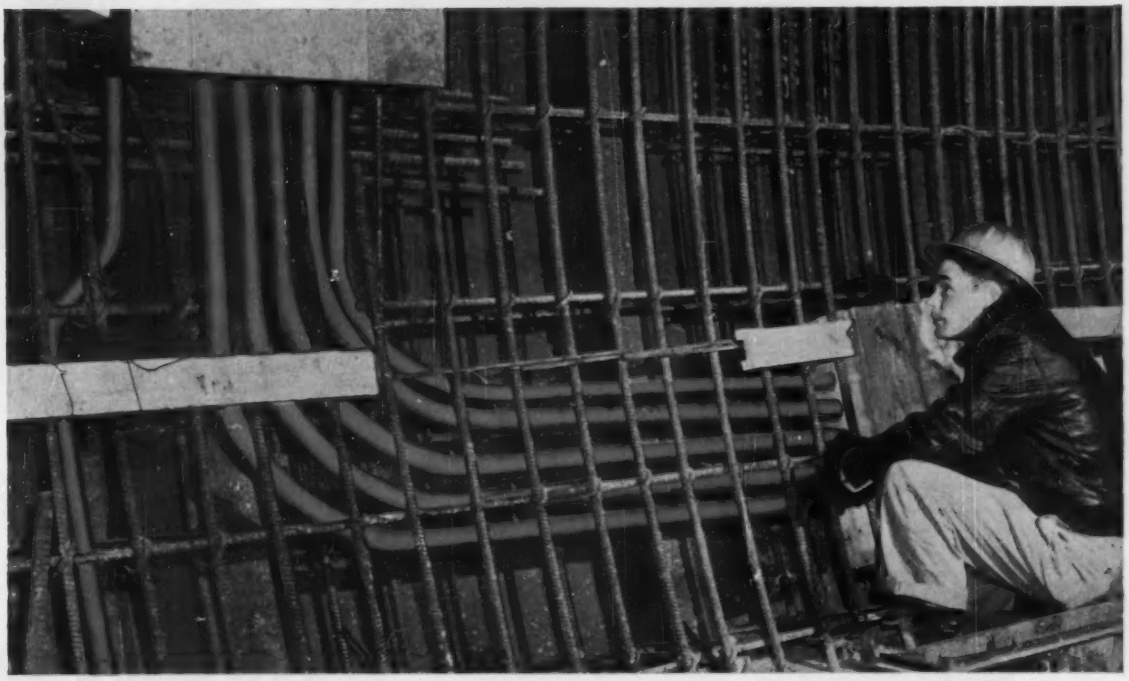
Porcelain Products, Findlay, Ohio, offers molded fiberglas reinforced **plastic outlet box,** fully insulated, that features ease of installation.

Quaker Ribber Division of H. K. Porter Co, Inc, Philadelphia, Pa., offers line of **vinyl electrical tape** in 8 and 10 mils, tested to 10,000 dielectric volts.

General Electric Co, Schenectady 5, N. Y., announces a two-pole, hermetically-sealed **subminiature relay** featuring positive adjustment of contact and plunger travel. It eliminates "blind assembly" in relay production.

(*More New Products on page* 192)

Power for the new 7,650-foot Baltimore Harbor Tunnel will be protected by EVERDUR Electrical Conduit



Everdur Electrical Conduit, nominal size 1½", connecting control box to sidewalk manhole—all conduit to be embedded in concrete.

A section of Everdur Conduit in the roadbed slab protects the vital traffic control system and air duct lighting.

THE BALTIMORE HARBOR TUNNEL†, under the Patapsco River, scheduled for completion in 1957, will be the largest "trench-type" tunnel ever built. Twin-tube sections are built on dry land, launched and concreted almost to zero buoyancy, then sunk in place and joined underwater by divers.

Power for traffic signals, alarms, air duct lighting, and shaft lighting circuits for this great tunnel will be protected by Everdur* Electrical Conduit—made from one of Anaconda's copper-silicon alloys. Everdur never rusts—offers high resistance to other types of corrosion. It provides dependable year-after-year protection—wherever water and corrosive atmospheres are a problem—or where conduit must be buried or embedded in concrete. Everdur is also tough—stands up under movement and vibration.

For detailed information, write: The American Brass Company, Buffalo Division, Buffalo 5, New York. In Canada: Anaconda American Brass Limited, New Toronto, Ontario.

*Reg. U.S. Pat. Off. 56134

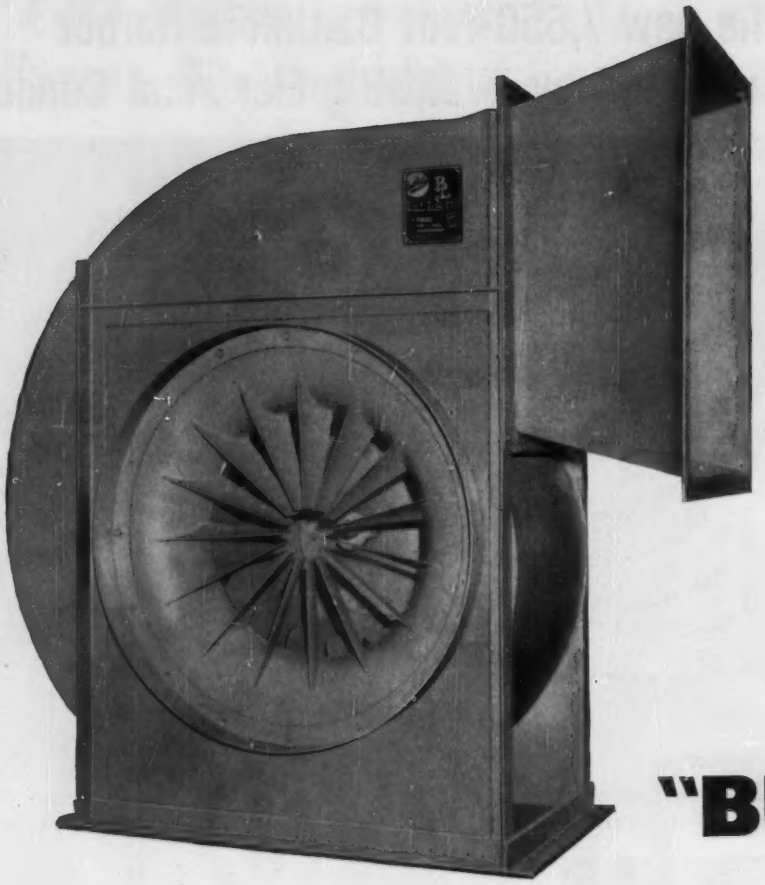
†Built by Maryland State Roads Commission; Merritt-Chapman & Scott Corp., General Contractors; Singstad & Baillie, Contracting Engineer; J. E. Greiner Co., Consulting Engineer.

EVERDUR ELECTRICAL CONDUIT

ANACONDA®

COPPER-SILICON ALLOYS

CORROSION-RESISTANT • STRONG • NONMAGNETIC • WORKABLE • WELDABLE



N

"BUFFALO"

FOR CLASS II THRU IV AND MECHANICAL DRAFT

THE NEW "Buffalo" Type "BLH" FAN is engineered for installations where total pressure requirements of 3¾" and up exist. These applications include mechanical draft, conduit air conditioning and many industrial applications.

CANTILEVERED INLET VANES eliminate center ring, reducing turbulence and improving air flow through the inlet. The die formed inlet vanes and inlet bell further contribute to smooth air flow, minimizing effects of unfavorable inlet conditions.

THE PROVEN BL WHEEL has a deep drawn flange to form a true half-circle with the inlet cone. Highly efficient non-overloading backward-curved blades, solid back plate and extra heavy hub make this wheel ideally suited to this service.

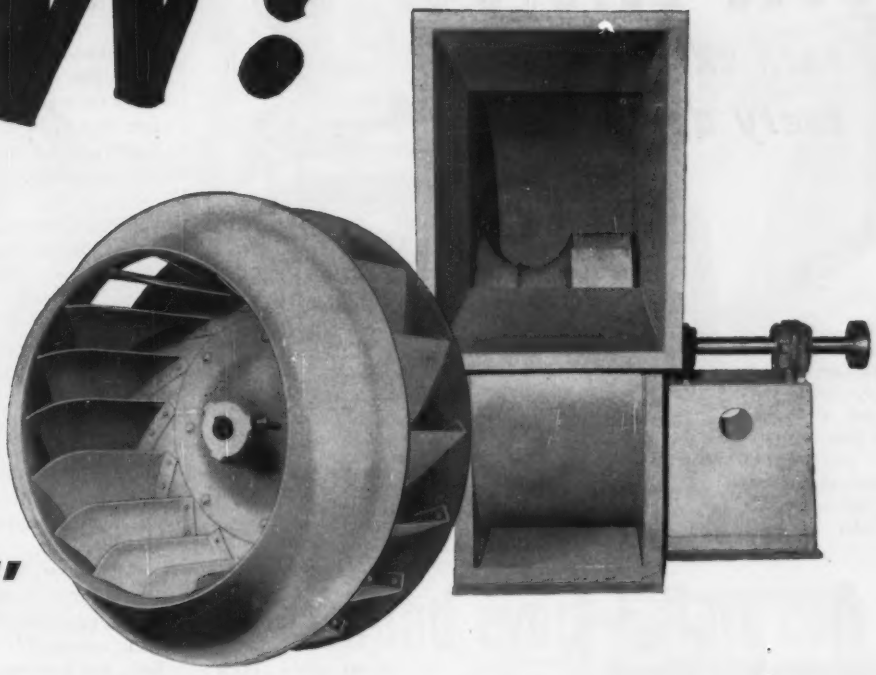
IMPROVED FAN OUTLET — reduces outlet air turbulence from fan cutoff into duct by making more even, gradual change from velocity to static pressure. Without this complete streamlining of inlet, housing AND outlet, such high efficiency is impossible.

BUFFALO FORGE
BUFFALO,

Canadian Blower & Forge Co., Ltd.,

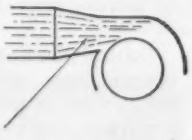
VENTILATING AIR CLEANING AIR TEMPERING PRESSURE BLOWING

EW!



"BLH"

VENTILATING—INDUSTRIAL SERVICE



86% MECHANICAL EFFICIENCY — made possible by a combination of inlet, wheel and housing design. The smoothest "air-ride" in fan history.

"Buffalo" "Q" FACTOR CONSTRUCTION gives you many years of trouble-free service. Housing is all-welded construction. Wheel and blades are riveted and welded for maximum strength, the basic design having been thoroughly tested in the Vacuum Pit, a "Buffalo" exclusive.

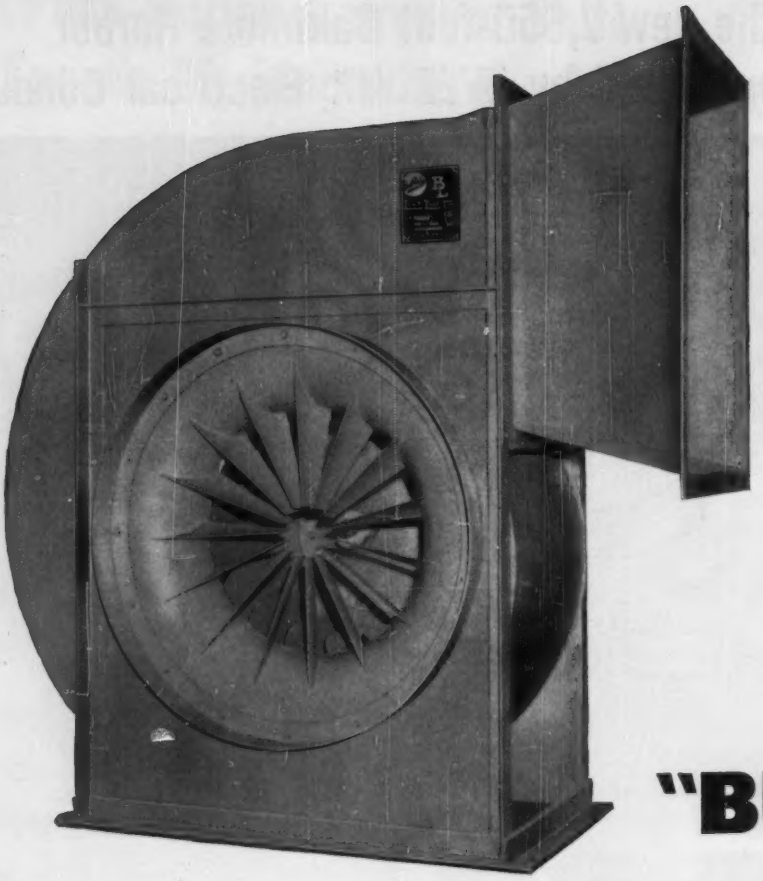
AVAILABLE in wheel diameters from 18¼" to 80¾", the new "Buffalo" "BLH" merits your consideration. Write for details on your company letterhead — today.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

COMPANY
NEW YORK
Kitchener, Ont.

"Buffalo"

INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING



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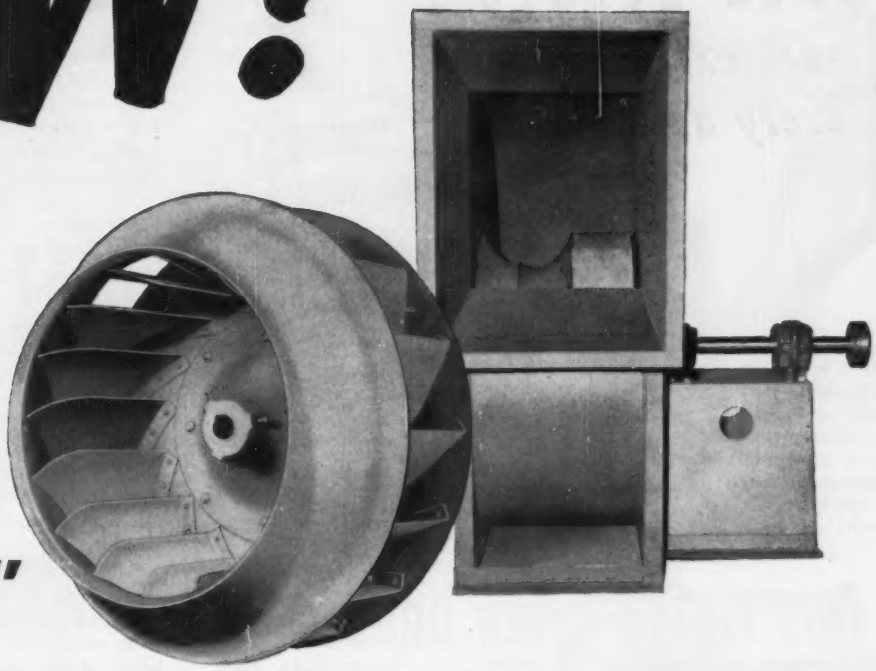
BUFFALO FORGE
BUFFALO,

Canadian Blower & Forge Co., Ltd.,

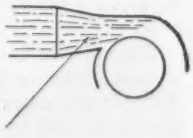
VENTILATING AIR CLEANING AIR TEMPERING PRESSURE BLOWING

EW!



"BLH"

VENTILATING—INDUSTRIAL SERVICE



86% MECHANICAL EFFICIENCY — made possible by a combination of inlet, wheel and housing design. The smoothest "air-ride" in fan history.

"Buffalo" "Q" FACTOR CONSTRUCTION gives you many years of trouble-free service. Housing is all-welded construction. Wheel and blades are riveted and welded for maximum strength, the basic design having been thoroughly tested in the Vacuum Pit, a "Buffalo" exclusive.

AVAILABLE in wheel diameters from 18¼" to 80¾", the new "Buffalo" "BLH" merits your consideration. Write for details on your company letterhead — today.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

COMPANY
NEW YORK
Kitchener, Ont.

"Buffalo"

INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING

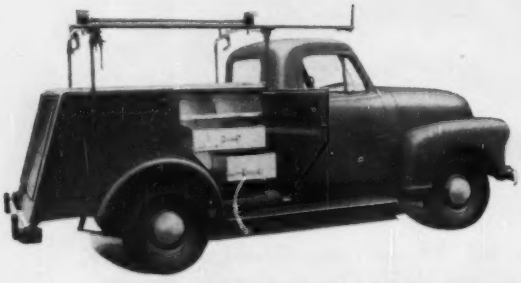
thousands of

YORK-HOOVER

MODEL 20IU76'S

earn extra dollars every day!

Illustrating latest type ladder bracket and adjustable partitioned drawers. Large interior provides a compact and orderly storeroom for materials and tools.



Right side view showing extra large material and tool drawers. Convenient location facilitates quick inventory for everyday service work.

QUICKER, MORE EFFICIENT SERVICE

This Model 20IU76 Service Body will provide many years of dollar-saving service for you. First, because compact design and lightweight, yet rugged, construction, combine to facilitate quicker, more efficient, service work. Second, because the Model 20IU76 Service Body is built by York-Hoover . . . a famous name in the transportation industry since 1892. Write for complete information today!

YORK-HOOVER MODEL 20IU76 SERVICE BODIES ARE EASY TO OBTAIN REGARDLESS OF YOUR LOCATION

GET THE FACTS! Write for Bulletin 937 today.

YORK-HOOVER
PUBLIC UTILITY BODIES

YORK-HOOVER CORPORATION
BODY DIVISION
YORK, PENNSYLVANIA

More New Products

(*Continued from page* 188)

International Chemical Co, Dept 106, 2628 N. Mascher St, Philadelphia 33, Pa., offers water soluable **anti-rust compound** that protects parts for 30 days or more under normal plant conditions.

Redmond Co, Inc, Owosso, Mich., has a line of ac **electric motors** rated 1/35 through ¼ hp in a shaded pole line and 1/30 through 1/3 hp in a split capacitor line. Stator shells and end frames are of magnesium.

Westinghouse Electric Corp's Sturtevant Division, Dept 118, 200 Readville St, Hyde Park, Boston 30, Mass., offers a line of 16 airfoil centrifugal **fans** with wheels ranging from 27 to 108-in. diam. The series is said to give 92% peak mechanical and 88% static efficiencies.

Bates Shoe Co, Webster, Mass., offers a static-conductive, **vinyl-soled shoe** that reportedly discharges static electricity as rapidly as it is generated.

Aluminum Co of America, 1501 Alcoa Bldg, Pittsburgh 19, Pa., says its drawn aluminum watthour **meter shell** counteracts effects of lightning bolts and heat waves.

Robertshaw-Fulton Controls Co, 2920 N. 4th St, Philadelphia 33, Pa., has a land suction **pyrometer** which measures heated gas from 0 to 2,900 F for uses like water tube boiler furnaces.

General Electric Co's specialty component motor department offers a **battery truck motor** for industrial electric trucks and small personnel carriers. The dc motor is rated 1 to 2 hp, 12, 24 or 36 v and from 1,000 to 2,400 rpm.

Jones Metal Products Co's Abolite Lighting Division, West Lafayette, Ohio, has an aluminum 24-in **reflector** for high bay lighting using H400-RC1 and H1000-C15 mercury vapor lamps. It is designed to give 18% and 16% uplighting, respectively.

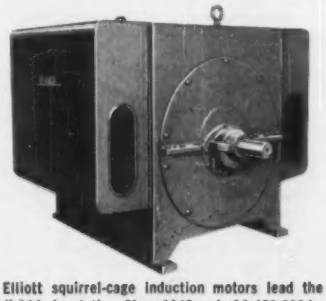
Rodale Mfg Co, Inc, Emmaus, Pa., has added 30 and 50-amp, 250-v **caps and cord connectors** with solderless pressure plate type terminals to its line of industrial electrical wiring devices.

LOOK BEHIND THE "INSULATION CURTAIN" BEFORE YOU SELECT A LARGE MOTOR

Skilled hands weave an impenetrable wall around every Elliott coil

● The slot section of this Elliott Class A stator coil is being hand-wrapped with a Mylar*-backed pliable, laminated mica sheet. The Mylar provides a thin, tough, flexible backing which allows a 30% increase in the amount of mica used. Mica combines known high dielectric strength with proven ability to withstand temperature and age. Through it all, the skilled hands of the Elliott craftsman guide it carefully and surely.

In coil insulation, the most modern materials are no better than their application. That is why coil insulation is a long painstaking process at Elliott. Extra precautions are taken at coil leads, joints and end sections. Vacuum-pressure impregnation plus *complete immersion* of each wound stator insures full penetration and an all-over sealing by a specially selected, time-proven insulating varnish. It's all part of an insulation process for 600 volt through 4800 volt coils first developed by Elliott in 1948 to withstand moisture, dirt, chemical fumes, etc. In all these years this insulation system has never suffered an operating failure. Get the facts on this sure "field-proven" insulation system. Ask your Elliott field engineer or write Elliott Company, Ridgway Division, Ridgway, Pa.



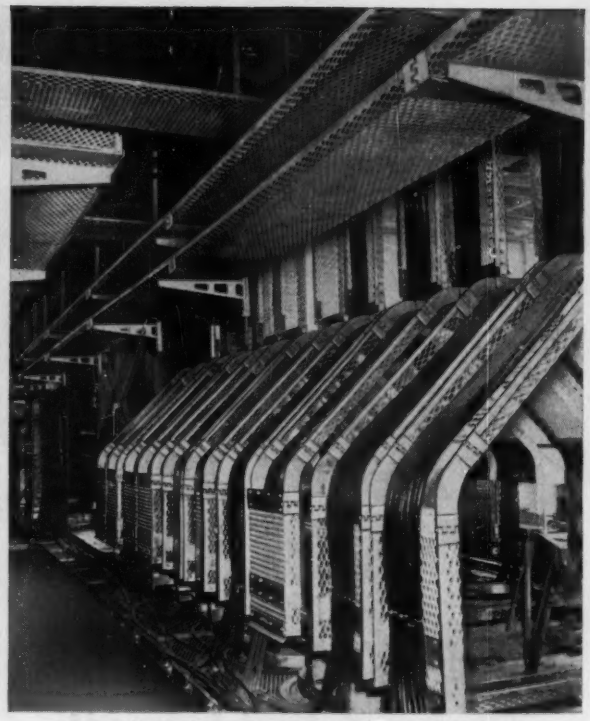
Elliott squirrel-cage induction motors lead the field in insulation. Since 1948, out of 1,400,000 hp of motors with this insulation system, (installed in 42 states and 14 foreign countries) **not one stator coil has failed due to insulation breakdown or deterioration.**

RG-9

* Dupont Trademark

ELLIOTT Company

Elliott large motor insulation is "field-proven"



Cope Cable Trough installed at Ohio Edison Company, Niles Station. Hatzel & Buehler, Electrical Contractors.

Many Miles of Cable Supported by COPE TROUGH

Ohio Edison engineers adopted Cope Cable Trough and Rakit supports for many miles of cable in the Niles Station. Utility engineers everywhere are turning to Cable Trough to save costs. The modern Cope design featuring the exclusive pin-type coupling save even more on installation costs.

The Cope 70,000 Series is more flexible than ever before since the new pin-type coupling eliminates the need for many standard fittings, is more readily installed than any other type trough, and fits easily into awkward spaces. Riser elbow for elevation changes.

Armor interlock and other semi-rigid cables are supported by Cope cable ladders. These, too, are readily installed with the pin-type coupler. Simple clamps secure cable to cross members.

Our engineers are ready to work with you. Write us today for full details on new 70,000 Series.

T. J. COPE, INC.

COLLEGEVILLE 4, PENNSYLVANIA

Cope

GROUND TENTS

ROD GRAPPLES

CABLE REEL JACKS

WARNING SIGNS

CROSS ARM SHEAVES

CATALOGS—BULLETINS

● **CURRENT TRANSFORMERS:** Features, application, construction, ratings, and dimensions of the JKS-5, 15-kv butyl-molded instrument transformer are given in Bulletin No. GEC-1380, 2 pages. General Electric Co, Schenectady 5, N. Y.

● **WELDING:** A 28-page directory for welding mild steel and low-alloy, high-tensile steels, Bulletin SB-1351 describes each electrode, its physical properties and chemical composition, recommended welding procedures, an operator's reference table, and typical applications for each electrode. Lincoln Electric Co, Cleveland 17, Ohio.

● **RADIANT CABLE:** Comparative heating costs, installation procedure, design-layout, heating requirements, cable specifications, and a spacing calculator are included in radiant cable manual, 24 pages. Ceilheat, Inc, 5212 Homberg Drive, Knoxville, Tenn.

● **LIGHTING FIXTURES:** Two 4-page catalog folders contain specifications, photometric data on two of manufacturer's commercial (No. 540 E) and industrial (No. 510 F) fluorescent lighting fixture models. Smithcraft Lighting Division, Chelsea 50, Mass.

● **STREET LIGHTING:** Non-technical Bulletin GEA-6316 includes illustrations of adequate and poorly lighted residential streets, explains how good lighting helps communities, and points out the need (only 2% of residential street lighting is adequate), 16 pages. General Electric Co, Schenectady 5, N. Y.

● **CRANES, MONORAILS:** Electrical equipment for cranes and monorail systems are described in 12-page Bulletin E-156 which includes rating charts and applications. Industrial Crane & Hoist Corp, 1536 S. Paulina St, Chicago 8, Ill.

● **WIRE WOUND RESISTORS:** Bulletin D-1a, 4 pages, provides data on winding technique, testing, tolerance, inductance, insulation, terminals, and temperature coef for wire wound resistors. International Resistance Co, 401 N. Broad St, Philadelphia 8, Pa.

● **TEST INSTRUMENTS:** Instruments for testing and calibrating current actuated protective devices are described in 68-page Catalog 3561. It includes full line of manufacturer's equipment for safety testing protective relays, oil circuit reclosers and related devices. Product descriptions, applications, technical data and diagrams are included. Multi-Amp Corp, 10 Third St, Newark, N. J.

● **LAMP BALLASTS:** Bulletin GEC-983H contains wiring diagrams, list prices, and electrical specifications for complete line of fluorescent lamp ballasts. It includes ballasts for general line fluorescents, plastic signs and outdoor applications, dimming and flashing, germicidal fluorescents, rapid-start and circline lamps, and dc operation, 12 pages. General Electric Co, Schenectady 5, N. Y.

● **TRUCK, TRAILER RESTRICTIONS:** Pocket-size 1956-57 booklet lists truck and trailer size and weight restrictions of all 48 states. It is free to common and private carriers. Four Wheel Drive Auto Co, Clintonville, Wis.

(*More Catalogs on page* 198)

Connect
COPPER with COPPER
ALUMINUM with ALUMINUM
use...

PAC-8
ACSR 6—1/0 Cu. 8—1/0

PAC-3
ACSR 8—2 Cu. 8—2

PAC-4
(formerly PAC 6—0)
ACSR 6—1 0 Cu. 6—2

PAC-7 (replaces PARC 6—0)
ACSR $\frac{1\ 0—336.4}{6—1\ 0\ A\ R}$ Cu. 8—1 0

BLACKBURN PAC CLAMPS

ELIMINATE CORROSIVE SOLDERS, VOIDS AND FLUXES !

There are many satisfactory copper connectors for connecting copper conductors.

There are many satisfactory aluminum connectors for connecting aluminum conductors.

Blackburn's PAC clamps combine the features of a good copper connector and a good aluminum connector to give you the best copper to aluminum connector available.

Our exclusive method (Patent applied for) of pressure casting molten corrosion resistant aluminum alloy around specially treated pronged copper liners establishes an intimate, low resistance contact of the two metals without using corrosive solder.

The copper liners, which cannot be mated incorrectly, surround the copper conductor establishing a good copper to copper contact.

The aluminum grooves surround the aluminum conductors, establishing a good aluminum contact.

Adequate contact surface and conductor separation is built into Blackburn's PAC clamps to insure long-lasting, trouble-free copper to aluminum connections without setting up cold flow or galvanic corrosion.

Spring action is inherent in the design of PAC clamps and is supplemented with an extra-heavy spring lockwasher insuring permanently tight connections which will withstand temperature fluctuations.

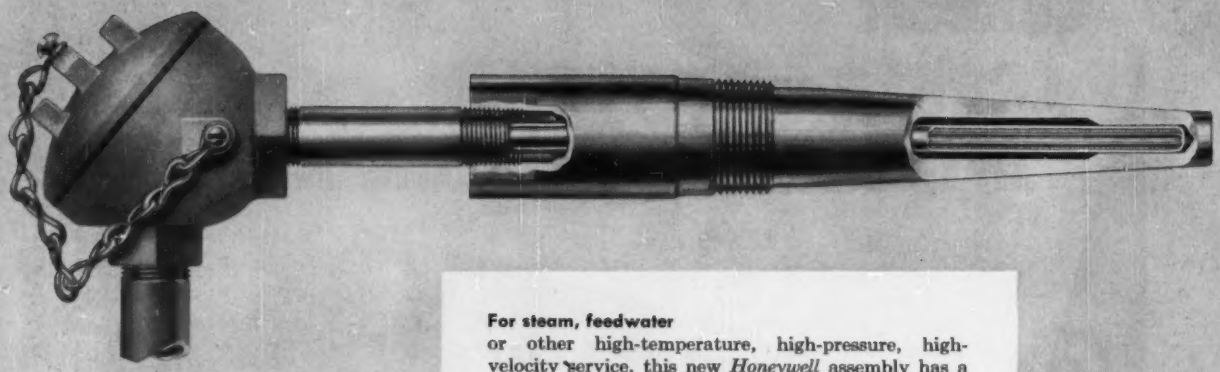
Hot dipped galvanized steel hardware is standard. Aluminum hardware available on all but Catalog #PAC-3.

AVAILABLE THROUGH ELECTRICAL WHOLESALERS EVERYWHERE

BLACKBURN COPPER TO ALUMINUM FITTINGS

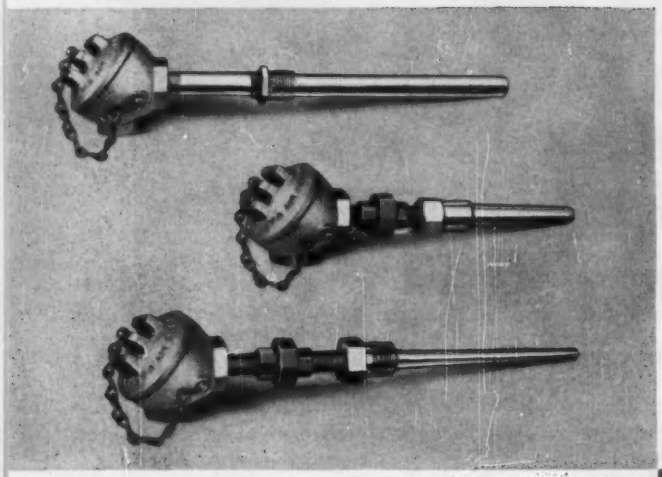
JASPER BLACKBURN CORPORATION

35 MADISON STREET • ST. LOUIS 6, MO. • PHONE: MAin 1-2821



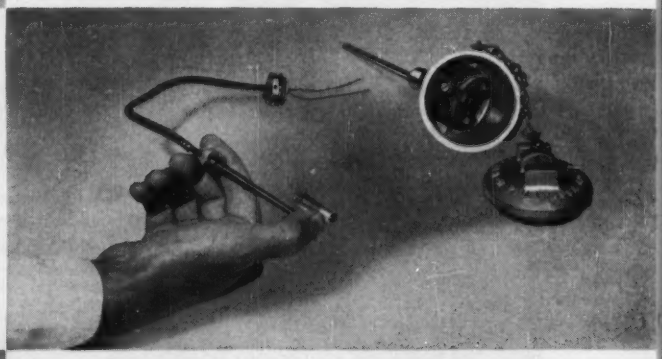
For steam, feedwater
or other high-temperature, high-pressure, high-velocity service, this new *Honeywell* assembly has a tapered well and a ceramic packing to protect the thermocouple against vibration.

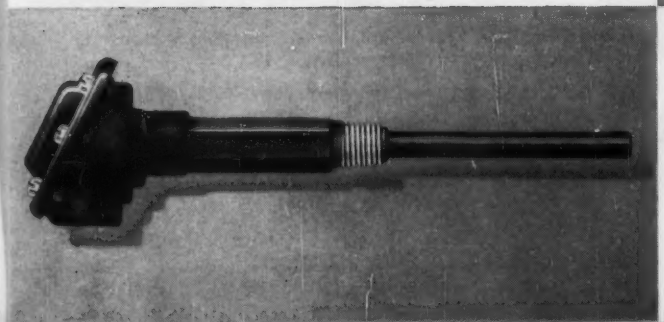
. . . with



Typical steam plant thermocouples
include (at top) a design for boiler gas and air temperatures and for turbine exhaust; (center) for economizer water; (at bottom) for boiler gas, air, or turbine exhaust.

Turbine bearing temperatures
are sensed by spring-loaded thermocouples in stainless steel assemblies.





For diesel engine cylinder exhaust
temperatures, these assemblies with rigid or flexible connections resist corrosion and oxidation when installed in exhaust manifolds.

You can measure all critical temperatures

Honeywell thermocouples

FOR THE precision temperature measurements such as—steam, water, flue gases, air, bearings, oil, hydrogen, transformers—needed by power plants, Honeywell has a complete line of thermocouples from packed elements in tapered wells for high-pressure, high-temperature steam, to bare wire peened into boiler tube walls. Typical assemblies are shown here.

Honeywell thermocouples are easily installed and provide long, reliable service. Measuring elements can be quickly replaced in wells with complete safety.

Accuracy of Honeywell thermocouples is assured by constant quality control checking. Every spool of wire used in their production is calibrated against laboratory standards at several points throughout the entire temperature range over which they will be used.

These thermocouples will actuate an equally complete and versatile line of *ElectroniK* recorders and indicators. Many thousands of these instruments are giving sensitive, precise performance with minimum service requirements in industrial plants throughout the world.

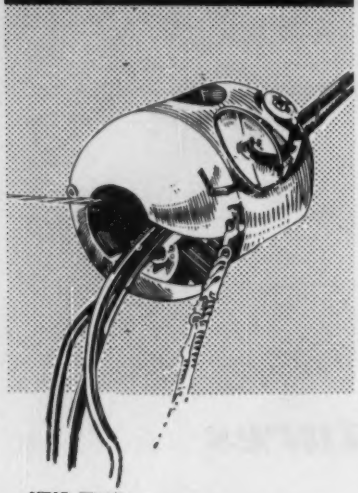
To learn more about how your plant temperature measuring problems can be solved, call your local Honeywell sales engineer . . . he has the answers, and he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

● REFERENCE DATA: Write for Bulletin 9050R, "Instrumentation for Steam Generation"... and Bulletin 9070, "Instruments for Electric Power Generation."

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

THREE TO ONE



IT'S THE
NEALE MODEL "K"
Only the
Model "K" Spinner
PLACES & SPINS
THREE SINGLE CABLES
Into
ONE COMPACT UNIT

ALSO SPINS SINGLE CABLE PERFECTLY

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OVERSEAS SALES:
Ericsson Telephone Sales Corp. of New York
Automatic Electric of Canada
Pirelli of Great Britain

CATALOGS—BULLETINS

(*Continued from page* 194)

● **REDUCTION GEARS:** Various parts of high-speed reduction gear assemblies for mechanical-drive steam turbines dimensions, weights and drawings are provided in Bulletin DB 1165, 4 pages. Gear capacities range from 50 to 5,000 hp. Westinghouse Electric Corp, Box 2278, Pittsburgh 30, Pa.

● **WELDING:** Equipment designed for welding of aluminum, stainless steel, copper, nickel, magnesium, aluminum bronze and other metals by consumable electrode gas-shielded process is described in Bulletin GEA-6028A, 8 pages. General Electric Co, Schenectady 5, N. Y.

● **V-BELTS:** Line of V-belts for drives employed in heavy industrial applications and miscellaneous light machinery drives is subject of Bulletin No. V-1400–B20-P, 8 pages. Complete listing of the many sizes is included. Worthington Corp, Oil City, Pa.

● **BONDING:** Eight-page booklet describes application techniques and precautions, advantages and limitations of adhesive bonding at room temperature. Rubber & Asbestos Corp, Dept P, Bloomfield, N. J.

● **LIGHTING UNITS:** Specifications, cross-sectional drawings, cp distribution curves, and utilization coef for line of shallow and deep recessed incandescent lighting units are listed in Folio B-60, 20 pages. Gruber Lighting, 125 S. First St, Brooklyn 11, N. Y.

● **SLIP RING ASSEMBLIES:** Complete ring assemblies, brush holder and brush and leaf assemblies, and contacts are described in 4-page Bulletin S-2056. Superior Carbon Products, Inc, 9115 George Ave, Cleveland 5, Ohio.

● **CONSTANT POTENTIAL CONTROL:** Complete line of constant potential control equipment of auxiliary drives for metal rolling and processing industries, typical installations, and functions of manufacturer's basic control panels for compound, shunt, and series motors are included in Bulletin GEA-6318, 4 pages. Also provided is data on construction features, standard heights, ratings, and dimensions. General Electric Co, Schenectady 5, N. Y.

● **AC METERS:** Catalog AC-587 describes specifications and applications of ac meter line for 120, 240 and 480-v, 25, 50 and 60 cycles available in 10,000 and 100,000-hr models. John W. Hobbs Corp, Division of Stewart-Warner Corp, Springfield, Ill.

● **WEATHER CONTROLS:** Details and diagrams of manufacturer's line of outdoor-type automatic heat controls are given in Bulletin C-256, 4 pages. Automatic Devices Co, Inc, 714 Hillgrove Ave, Western Springs, Ill.

● **POWER PLANTS:** A 16-page booklet, Form 31922, available in English, French, Spanish, and Portuguese, describes and illustrates uses of permanent or portable Diesel electric sets. Caterpillar Tractor Co, Peoria 8, Ill.

● **SILICONE VARNISH:** An 8-page data sheet describes uses, properties, and application procedures of R-620 silicone impregnating varnish for high temperature electrical insulation systems. Union Carbide & Carbon Corp, Silicones Division, 30 E. 42nd St, New York 17, N. Y.

● **RC DOUBLE BREAK AIR SWITCH:** Bulletin GEA-6483, 2 pages describes RC double break air switches. General Electric Co, Schenectady 5, N. Y.

● **V-8 ENGINES:** Operating features, testing program on manufacturer's line of V-8 engines for heavy-duty trucks are offered in Booklet CR-637-F, 16 pages. International Harvester Co, Consumer Relations Dept, 180 N. Michigan Ave, Chicago 1, Ill.

TECHNICAL LITERATURE

CORROSION: National Association of Corrosion Engineers, 1061 M & M Bldg, Houston 2, Tex., has published 32-page "Ten Year Index to Corrosion, 1945-54." Compiled by Norman E. Hamner and J. F. Van der Henst, Jr, it includes about 4,000 references and 1,056 names, alphabetically indexed. The index has numerous tables of data. Per copy, postpaid, NACE members $5; others, $7.50. Add 65¢ for Book Post Registry to addresses which are the United States, Canada and Mexico.

MAGNETIC CORES: Two reports of Armed Forces research on application of magnetic cores in computers have been released by Office of Technical Services, U. S. Dept of Commerce, Washington 25, D. C.

● "Ferromagnetic Core Logical Circuitry and its Application to Digital Computers" describes early magnetic core delay lines and the relative advantages, disadvantages and principles of magnetic core shift register operation. (PB 111954, 59 pages, $1.50)

● "Analogue Computation of Quotients and Functions Containing Quotients Using Magnetic Cores," (PB 111969, 13 pages, 50¢).

ASTM STANDARDS, PAPERS: Recent publications of American Society for Testing Materials. 1916 Race St, Philadelphia 3, Pa., include:

● Third edition of "ATSM Stndards on Light Metals and Alloys, Cast and Wrought" with specifications and test methods, and ingots, castings, bars, rods, wire, forgings, pipe and tube, sheet and plate, wrought products for electrical purposes, filler metal and electroplating; 276 pages, $3.50.

● "The Mechanical Properties of Wrought Phosphor Bronze Alloys" shows effect of cold-working on mechanical properties of a series of eight phosphor bronze alloys in two conditions in the form of cold-rolled strip with varying tin content from 0.5 to 10%; 120 pages, $3.

● "Symposium on Basic Effects of Environment on the Strength, Scaling, and Embrittlement of Metals at High Temperatures" provides data on oxidation and surface effects and on creep under controlled atmospheres; 120 pages, $2.75.

UNDERWRITERS' LABORATORIES: Recent publications of Underwriters' Laboratories, Inc, 207 E. Ohio St, Chicago 11, Ill., include:

● Electrical Appliance and Utilization Equipment List, May 1956.

● Electrical Construction Materials List, May 1956.

Send requests on company letterhead.

HERE'S HOW GRAYBAR CAN HELP YOU COMPLETE THE PICTURE

(1) A Supply Service Geared to Your Needs. Graybar offers you efficient flexible procurement of *all* the electrical supplies and equipment you need for pole-line construction or maintenance. For one unit — or a thousand — the complete list of materials, equipment and supplies you require are available from a *single*, dependable source — Graybar. Many of these products are listed on the following pages.

(2) Specialized Service. Graybar can deliver completely assembled crossarms for any structure you design — fabricating and boring of the arms completed and hardware attached. There are 130 Graybar offices and warehouses located in the principal cities from coast-to-coast, many of which maintain local stocks of tools and utility items to assure you of prompt, efficient deliveries right to your job site. (See Graybar listing on last page of this special section.)

(3) Experienced Assistance. Your nearby Graybar representative can provide accurate catalog and quotation information on the thousands of construction items available via Graybar. And to complete the "picture", Graybar Outside Construction Specialists are always on call to tender technical assistance on tough or unusual problems along with regular service. His friendly understanding stems from Graybar's years of association with the utility industry.

655-96

CALL **GraybaR** FIRST FOR

GRAYBAR ELECTRIC COMPANY, INC., 420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK, IN OVER 130 PRINCIPAL CITIES

See the following pages for more information about items manufactured by typical Graybar suppliers

ALCOA... GRAYBAR

Let Graybar complete the picture . . .

*GraybaR Everything Electrical *GraybaR ELECTRIC COMPANY

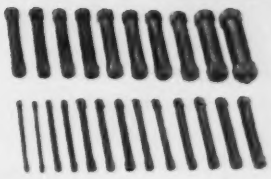
Alcoa and Graybar team up to offer a bonus for business that can't be beat! Here's what you get when you specify Alcoa and funnel your orders through Graybar.

1 **A single source** for all your aluminum conductors and aluminum accessories; undivided responsibility, less paper work, fewer problems of coordinating delivery schedules.

2 **A complete line** of aluminum conductors and aluminum accessories made for each other . . . designed, engineered and produced by the world's most experienced manufacturer.

ALUMINUM COMPANY OF AMERICA,
2318-F Alcoa Building, Pittsburgh 19, Pennsylvania.

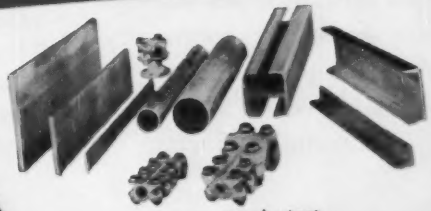
Line Wire and Covered Cable



ACSR and All-aluminum Conductors

Tools for Applying Accessories

Complete Line of Conductor Accessories



Bus Conductors

Rigid and Thin-wall Conduit

a single source . . .

and a complete line

Always use Alcoa® Aluminum Accessories with aluminum conductors.

THE ALCOA HOUR
TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS

Let Graybar complete the picture . . .

Everything Electrical Graybar Electric Company

4 REASONS WHY RAINIER CROSSARMS belong in YOUR pole-line program

1 **SELECTION** — Extra value in crossarms, as in many other quality products is the end result of *planned manufacture*. With American Crossarm and Conduit Company, careful selection of timber for manufacture of Rainier crossarms is the first important step.

2 **KILN DRYING** — Rainier kiln drying is superior because of scientific control during the seasoning period — correct temperature and the right humidity all the time while in the kiln means all fungus growth killed—timber seasoned throughout.

3 **SEASONING**—Rainier air seasoned crossarms are also carefully seasoned by control of air circulation and by the location of the seasoning sheds, as well as proper piling of the timber during the drying period.

4 **STOCKS** — The American Crossarm and Conduit Company, manufacturers of Rainier crossarms, through Graybar offer the careful buyer of crossarms an additional service — stocks at strategic locations. For planned-ahead buying or for emergencies, this fact is your assurance of lower shipping costs — quicker service.

Remember! A crossarm produced from improperly or carelessly processed timber might cost less at the time of purchase, but it certainly *is not cheaper per year of life service.*

For further information on crossarms that may pay you dividends in lowered maintenance and replacement costs, write or phone your nearby Graybar Line Construction Specialist. Graybar is located in over 130 principal cities.

AMERICAN · CROSSARM AND CONDUIT COMPANY

RAINIER WOOD PRODUCTS TRADE MARK

Let Graybar complete the picture . . .

Everything Electrical Graybar Electric Company

PACKAGED AND PRE-MEASURED FOR CONVENIENCE

- Carton protects rope
- Rope stays clean
- Uncoils from carton
- No inner lashing
- Uncoils without kinking
- Easy to handle
- Simplifies inventory

6 Sizes—10 Put-ups
in Individual Cartons
¼", 5/16", ⅜", ½" dia. in 600 and 1200 foot coils—⅝" and ¾" dia. in 600 foot coils only.
All Sizes and Constructions in Full Coils

Time-saving is the big economy in buying American Brand Rope in cartons. Red surface markers every five feet enable you to quickly pull out any desired length of rope. You don't need to keep a long area free for measuring.

Sturdy cartons protect the rope and keep it clean until used. The carton openings assure proper starting of rope to avoid kinks. Additional punch out "plugs" enable you to see how much rope remains in the carton.

AMERICAN MANUFACTURING COMPANY
Brooklyn, New York
WESTERN MILL: ST. LOUIS CORDAGE MILLS, ST. LOUIS 4, MO.
MAKERS OF A COMPLETE LINE OF CORDAGE PRODUCTS
ROPE (Manila, Sisal, Jute, Dacron, Nylon, Polyethelene, Saran, Glass)
TWINE, OAKUM, PACKING, BALER TWINE AND
ELECTRICAL YARNS

HANDY COILS
¼", 5/16", ⅜" and ½" dia. rope in 100 foot connected coils.

"AMERICAN BRAND"
PURE MANILA ROPE

We can supply "American Brand" Rope in all sizes and types for every utility use.

Let Graybar complete the picture . . .

Graybar Everything Electrical Graybar Electric Company

"We found by actual tests that FUSETRON dual-element FUSES would eliminate Motor Burnouts on our Welders"

"Here are the facts . .

"In 1946 we were having trouble with single phasing and subsequent burnout of our 3-phase welders. Motor repairs and replacements, plus the down-time was very costly.

"Could this situation be corrected, we wondered, by individually protecting each welder with Fusetron fuses?

"We ran our own test to find out. On 400 ampere welders — 3 pole fuse blocks were mounted in a steel enclosure. 80 ampere, 250 volt Fusetron fuses were installed on the load side of the enclosure.

"The circuits were then single phased. On every test the Fusetron fuses opened in 21 to 23 seconds.

"On checking further with a hook ammeter we found the locked rotor current to be 325 amperes.

"As a result of these tests, we protected all 62 welding machines with Fusetron fuses in the proper motor protection sizes.

"Sure, since then we have blown a number of fuses — but we have not had one motor burnout due to single phasing. Fusetron fuses have certainly cut costs for us.

"Today, there are 147 welding machines in operation and each is protected with Fusetron fuses."

Ralph McColm
CHIEF ELECTRICIAN
BLACK SIVALLS AND BRYSON, INC.
OKLAHOMA CITY, OKLA.

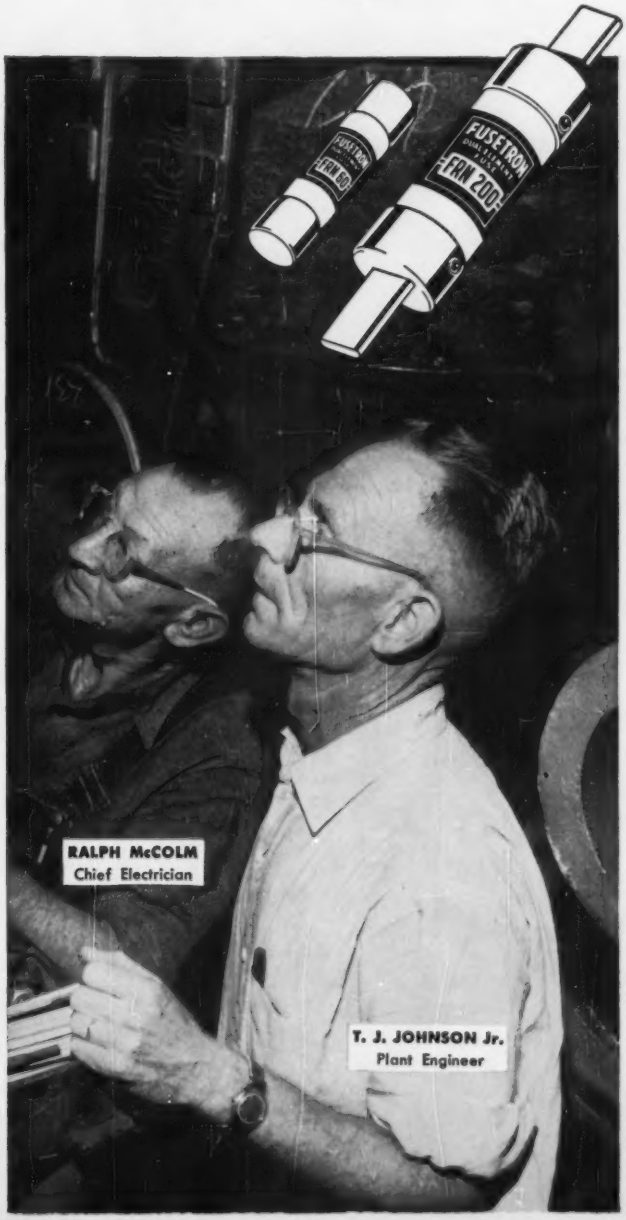
Let Graybar complete the picture . . . .

Everything Electrical
GRAYBAR
ELECTRIC COMPANY

why Fusetron Fuses can protect motors against burnout

Fusetron fuses have a tremendous time-lag. This means, on normal installations, Fusetron fuses can be used in motor-running protection sizes — without opening on motor-starting current or other harmless overloads.

When so used, Fusetron fuses protect motors from any harmful excess of current caused by such things as single phasing, overloading, wrong voltage, being stalled, lack of oil, tight belt, worn bearings or anything that causes the motor to draw a dangerously excessive current.



Fusetron Fuses provide simplest way to prevent damage from single phasing

When single phasing occurs, the current in the remaining phase increases about 100%. (Theoretically 73%, but change in efficiency and power factor makes it about 100%).

This 100% overload on Fusetron fuses of motor-running protection size opens them and stops flow of current to the motor.

FUSETRON FUSES DO MORE THAN PROTECT MOTORS AGAINST BURNOUT

They provide 10 Point Protection

1. High interrupting capacity — protect against heaviest short-circuits. Have proven on tests to open safely on circuits set to deliver in excess of 100,000 amperes.
2. Protect against needless blows caused by excessive heating — lesser resistance results in cooler operation.
3. Protect against needless blows caused by harmless overloads.
4. Provide thermal protection — for panels and switches against damage from heating due to poor contact.
5. Protect against waste of space and money — permit use of proper size switches and panels.
6. Protect motors against burnout from overloads.
7. Give DOUBLE burnout protection to large motors — without extra cost.
8. Protect motors against burnout due to single phasing.
9. Make protection of small motors simple and inexpensive.
10. Protect coils, transformers and solenoids against burnout.

More information on Fusetron dual-element fuses is available. Write for bulletin FIS.

FOR LOADS ABOVE 600 AND UP TO 5000 AMPS. — USE BUSS Hi-Cap FUSES!

On 600 volts or less, they have interrupting capacity sufficient to handle any fault current regardless of system growth.

They can be coordinated with Fusetron fuses on feeder and branch circuits to limit fault outages to circuit of origin.

Write for bulletin HCS.

Play Safe! *Install FUSETRON dual-element Fuses and BUSS Hi-Cap Fuses throughout entire Electrical System!*

656

BUSSMANN MFG. CO. FUSETRON BUSS — Div. of McGraw Electric Co.

University at Jefferson, St. Louis 7, Mo.

Let Graybar complete the picture . . .

Everything Electrical — Graybar

WHAT THE WELL DRESSED LINEMAN WILL WEAR...

from one convenient source...

Graybar

Belts to bits . . . climbers to come alongs . . . linemen work more efficiently and in greater safety with equipment they know and respect.

For special or emergency orders, or for regularly-scheduled replacements, your nearby Graybar office or warehouse can furnish tools, supplies and equipment best suited to the job. You make your selection from the finest, most complete lines of products available – made by the nation's leading manufacturers. Graybar ships your order promptly. You save purchasing time and paper work.

Call Graybar for all of your other pole-line needs as well. You can rely on your local Graybar office or warehouse to provide complete, accurate information on everything electrical for pole-line construction and maintenance. For special help on tough or unusual problems, feel free to ask for the assistance of a Graybar Outside Construction Specialist.

634-93

GRAYBAR ELECTRIC COMPANY, INC.
420 Lexington Avenue, New York 17, N. Y.

Call Graybar first for...

*Graybar Everything Electrical *Graybar Electric Company
Since 1869 *Reg. U.S. Pat. Off.

IN OVER 130 PRINCIPAL CITIES

Let Graybar complete the picture . . .

*Graybar Everything Electrical *Graybar Electric Company

In Taconite processing plant, ANACONDA Interlocked-armor cable is used for feeder line . . . resists weather and industrial hazards.

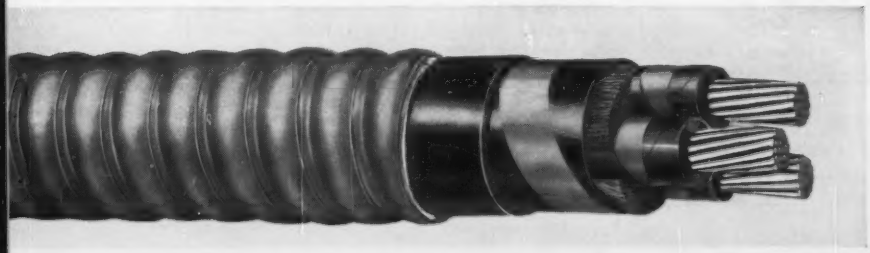
New cable puts power where you want it—fast!

With ANACONDA Interlocked-armor cable you bring power to new load centers faster—change plant layout quickly, or add new facilities in a hurry!

It is economical—installed fast—indoors or out—with simple supporting devices . . . trained easily around corners, columns and other obstructions in long unbroken runs. Circuits are easy to relocate . . . always accessible. And this cable's interlocked metal-tape armor affords high mechanical protection against all types of damage.

The Man from Anaconda, or your nearest Anaconda distributor, will be happy to give you full information. Or write to: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

ASK THE MAN FROM ANACONDA®
FOR INTERLOCKED-ARMOR CABLE



Anaconda Interlocked-armor cable comes in sizes No. 6 Awg to 750 Mcm—copper or aluminum—up to 15 kv—Underwriters' approval for 600 volts and 5000 volts. Available with rubber-, plastic- or varnished-cambric-type insulation.

Let Graybar complete the picture . . . .

Everything Electrical Graybar

it's BEAUTIFUL!
it's GLAMOROUS!
it's VERSATILE!

it's *Edge-Glo* by CURTIS

A GRAYBAR FEATURE FIXTURE FOR '56

CURTIS LIGHTING, INC.

CURTIS LIGHTING, INC.
6135 West 65th Street • Chicago 38, Illinois
In Canada: Curtis Lighting of Canada, Ltd.
195 Wickstead Ave., Leaside, Toronto 17, Ont., Canada

IT'S BEAUTIFUL:

A spectacular glowing beauty that will enhance the appearance of any interior. The new Curtis Edge-Glo is long, thin (overall depth just 3½") with side panels softly illuminated by reflected light to give new modern ceiling construction an effect so startlingly beautiful that it offers unlimited design possibilities.

IT'S GLAMOROUS:

This glamorous luminaire brings startling effects to any new or existing decorative motif. It is sleek, streamlined, sparkling, the new Edge-Glo lends itself to dazzling effects that challenge even the most daring imagination. It may be close-ceiling mounted as a direct luminaire or pendant mounted for a 50-50 direct-indirect light distribution.

IT'S VERSATILE:

This new Curtis unit satisfies modern architectural design demands as well as high-quality illumination requirements. Unlimited designs may be achieved by mounting units individually, in patterns, or in continuous lines. Edge-Glo utilizes 2, 4 or 6 40-Watt, T12, 48" rapid start lamps. It is available with either rigid molded polystyrene plastic egg crate louver or Holophane No. 6016 plastic Controlens®. The new Curtis Edge-Glo is constructed of aluminum, Alzak processed after forming, or baked white Fluracite enamel.

For further details write today or contact the Lighting Specialist nearest you.

® Holophane Company, Inc.

Let Graybar complete the picture . . .

Everything Electrical Graybar Electric Company

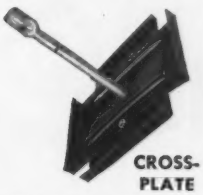
Give the Guy a CHANCE

CHANCE ANCHORS MEET EVERY GUYING NEED

8-WAY EXPANDING
The guy load is distributed all around the anchor—no wasted space between blades. Usually installed in clay or loam.

NO-WRENCH SCREW
For hand or machine installation. Pitch-controlled blade goes down faster and adds to holding power in sandy soil, soft clay or loam.

NEVER-CREEP
Made of structural steel. Pulls *entirely* against solid, undisturbed earth. For extra heavy loads in clay or loam.



CROSS-PLATE
For heavy-duty anchoring in machine-bored holes. Holds better than logs or slugs. Saves time and money.

SWAMP SCREW
For swamps, marshes, quicksand, river crossings or seasonally flooded areas. Screws down deeply by adding sections of pipe.

8-WAY CONE
Acts as inverted wedge. Flaring base and flat faces increase wedging action. Used in rocky areas with rock wedging.

EXPANDING ROCK
No grouting necessary. The greater the pull, the tighter it wedges against solid rock. Set in 2" drilled hole.

WRENCH TYPE SCREW
All steel—double arc welded. Anchor hub absorbs installation strain. For light loads in sandy soil, soft clay or loam.

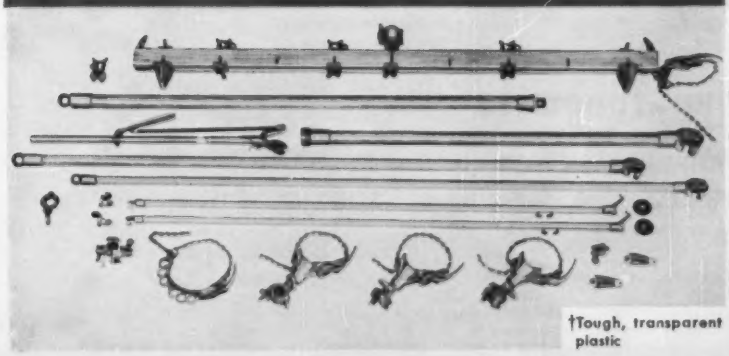
POLE KEY ANCHOR
Keys poles at the butt to reinforce them against unbalanced loads in soft soil. Ideal for congested urban areas.

SPECIFY THE LINEMEN'S HOIST
BE SURE OF EXPANSION WITH THIS EXPANDING BAR
SAFETY POINT PIKE
PLASTIC COATED LAMINATED
FAST CUTTING REAMING TRIP AUGER
POLE TONG

For the Best in Service on the Best in Line Construction and Maintenance Materials Specify CHANCE from GRAYBAR

C56-17

Get the "Linemen's Preference" in Maplac† coated Aluminum-fitted Hot Sticks



†Tough, transparent plastic

*AGP

Keeps Tap Connections Troublefree

*Aluminum General Purpose. Coated with fortified cadmium. Protect your conductor with the clamp that's ahead of the trend.

A·B·CHANCE CO·

Let Graybar complete the picture . . .

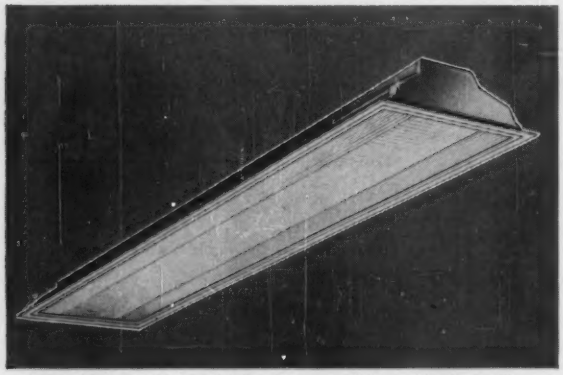
Everything Electrical Graybar Electric Company

Lighting by DAY-BRITE makes the big difference...

Announcing a new line of integrated recessed

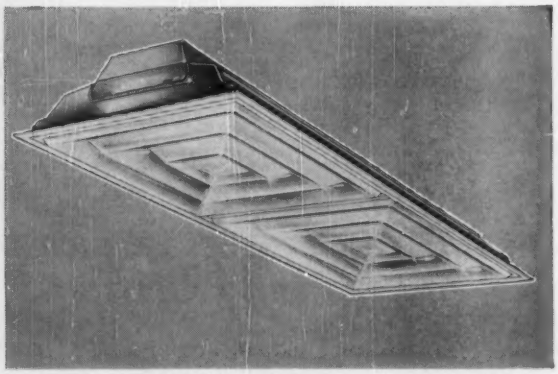
lighting compatible with all 63 ceiling systems

including—acoustical ceilings using exposed runner, exposed panel, exposed grid, concealed mechanical, metal "Tee-Bar" suspension... also conventional plaster ceilings.



New, shallower 12-in. wide Troffers, available with plastic Clear-tex, egg-crate louver or low-brightness Controlens® enclosures.

®Holophane Co., Inc.



24-in. wide MOBILEX®, available with translucent plastic, egg-crate louver or glass enclosures.

Get details of new economies

Your Day-Brite representative has full details of the economies of Day-Brite's new line of integrated recessed lighting. Call him—you'll find this information valuable.

Certified Lighting for a Better America

61136

"DECIDEDLY BETTER" DAY-BRITE Lighting Fixtures

Day-Brite Lighting, Inc.
5417 Bulwer Ave.
St. Louis 7, Missouri

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

Let Graybar complete the picture...

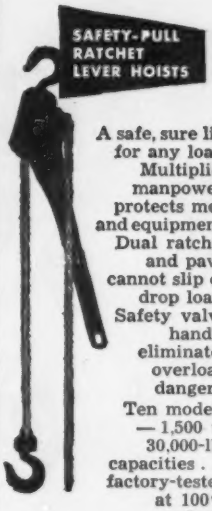
Everything Electrical Graybar Electric Company

users prefer Coffing Hoists

for multiplying manpower · increasing safety · saving maintenance costs

QUIK-LIFT ELECTRIC HOISTS

Ruggedly built for the most continuous assembly line use. For long life, all moving parts are sealed, running in oil. For safety, parts are tested at 100% overload. Seventeen models — 500 to 4000-lb. capacities.

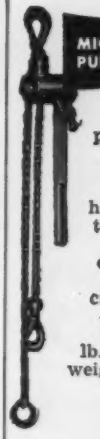


SAFETY-PULL RATCHET LEVER HOISTS

A safe, sure lift for any load. Multiplies manpower, protects men and equipment. Dual ratchet and pawl cannot slip or drop load. Safety valve handle eliminates overload dangers. Ten models — 1,500 to 30,000-lb. capacities . . . factory-tested at 100% overload.

CHALLENGER SPUR GEAR HOISTS

All steel, yet weighs only 39½ lb. Formed steel housing resists impact . . . does not crack under shock loads. Back plate is laminated for greater rigidity. Load may be adjusted up or down a fraction of an inch. Hoist hangs true even without load. May be completely disassembled in minutes with ordinary tools. Factory-tested at 100% overload . . . has five-to-one safety factor. Two models — ½- and 1-ton capacities.



MIGHTY-MIDGET PULLERS

Big pulling power in a small package. Light, compact, a Mighty-Midget hangs easily on a tool belt. Handle can be used either as a lever or a high-speed crank. Two sizes — 500-lb. model weighs only 6½ lb., 1,000-lb. model weighs only 9½ lb.

Coffing Hoist Division

Duff-Norton Company

Danville, Ill.

These Duff-Norton *Jacks*

save utilities time · energy · money

Pole Pulling Jacks

Duff-Norton Pole Pulling Jacks pull or straighten utility poles without laborious digging. Hinged channel base permits jack operation at an angle or in upright position as required. "Service" need not be interrupted when these jacks are used.

Specifications

Jack No.	Capacity Tons	Height Inches	Raise Inches	Base Inches	Weight Pounds
500	15	37½	23	10x24	250

Cable Reel Jacks
(single action)

Equipped with adjustable cable reel lift, incorporating a steel hook which can be placed at any point on the lifting rack. Reels of different diameters can be picked up at any height. No. 524-MCR is especially adapted for warehouse use, handling cable, wire, hemp rope, leather belting, etc.

Jack No.	Capacity Tons	Height Inches	Raise Inches	Weight Pounds	Base Inches
520-CR	5	20	11½	66	12½x26½
524-MCR	5	21	14	68	9x19
1022-CR	10	38	12	100	9¾x24
1522-CR	15	39	11	138	10x24
*1030-CR	10	30	14	110	.....

*Attached to T-Frame Oak Base. Furnished with steel operating bar.

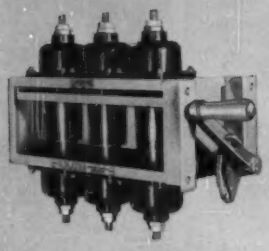
Duff-Norton Company

Main Plant and General Offices, Pittsburgh 30, Pa. · Canadian Plant, Toronto, Ont.

Let Graybar complete the picture . . .

For the best in high voltage equipment . . .

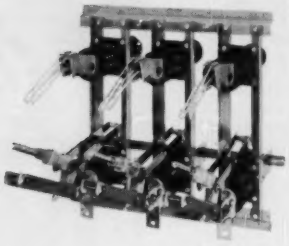
SEE 3E



ISOLATORS

Unmatched for efficiency in disconnecting or interrupting high voltage lines. Straight line action . . . takes only one-third the space needed by comparable knife-type switches. Rated to 15 K.V.

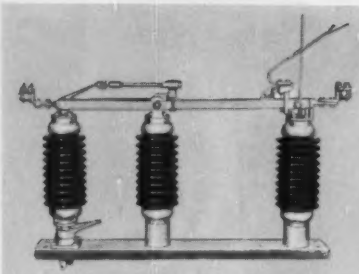
Disconnect Isolators. . . . Bulletin 140
Air Interrupter Isolators Bulletin 138



AIR INTERRUPTER SWITCHES

Auto-Speed interruption is automatically made independent of operator's speed. Dry-type interrupter unit on each pole . . . arc is gas extinguished . . . no inflammable oils or liquids . . . cost less than circuit breakers.

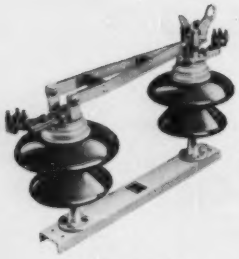
Bulletin 142



8400 AIRBREAK SWITCHES

Straight line current path increases ability to withstand "short time" currents. Special high pressure contacts and braidless design eliminate 90% of usual friction and strain . . . The 8400 is remarkably easy to operate.

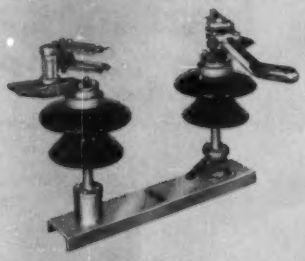
Bulletin 327



DISCONNECTS

Rugged hook stick operated, disconnecting switches. Double blade type, built in full accordance with N.E.M.A. standards. Wide variety of designs. Indoor types rated to 34.5 K.V., outdoor to 161 K.V.

Indoor Disconnects. . . . . Bulletin 139
Outdoor Disconnects. . . . Bulletin 324



SIDE BREAK SWITCH

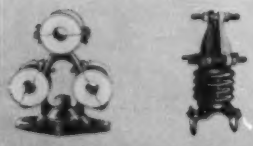
Pivot motion sets up a powerful ice-shattering and wiping action before the blade starts to open. The best buy in low cost, outdoor switches. High pressure contacts heavy silver overlays, braidless for longer life. Rated to 161 K.V.

Bulletin 335

OUTDOOR BUS SUPPORTS

A complete line of supports for flat or round busses in voltage ratings up to 69 K.V. Mounting devices for flat or pipe mountings. Ruggedly built of top quality materials to N.E.M.A. BIL Standards.

Bulletin 271



CLAMP INSULATORS AND BUS SUPPORTS

Wide range of sizes and types; made of the finest materials; designed for rapid, safe installation; prompt delivery from large stocks.

Clamp Insulators. . . . . Bulletin 201
Indoor Bus Supports. . . . Bulletin 226

SEE 3E FOR EXPERIENCED, VERSATILE ENGINEERING

3E's large engineering staff is especially adept at adapting or combining equipment to suit your exact needs, whether for complete switching centers or additions to existing equipment. See 3E for unusual requirements . . . corrosive or dusty atmospheres . . . unique space demands . . . portable units . . . or a careful design to meet tomorrow's expansion.

3E

ELECTRICAL ENGINEERS EQUIPMENT CO.
MELROSE PARK, ILLINOIS

Let Graybar complete the picture . . .

Graybar — Everything Electrical — Graybar Electric Company

EVERSTICK ANCHORS

FOR TOUGH ANCHORING JOBS!

Today's anchoring jobs bring Eversticks to the forefront. They provide tight, safe anchoring . . . always in excess of rated capacities. Easy and quick to install . . . made of finest grade maleable iron with superior rust-resisting qualities and exceptional toughness. Every Everstick is plainly marked for ease of handling and storing.

The nut housing feature of the Everstick prevents rod from slipping thru while installing and provides a solid substantial base for the expanding blades.

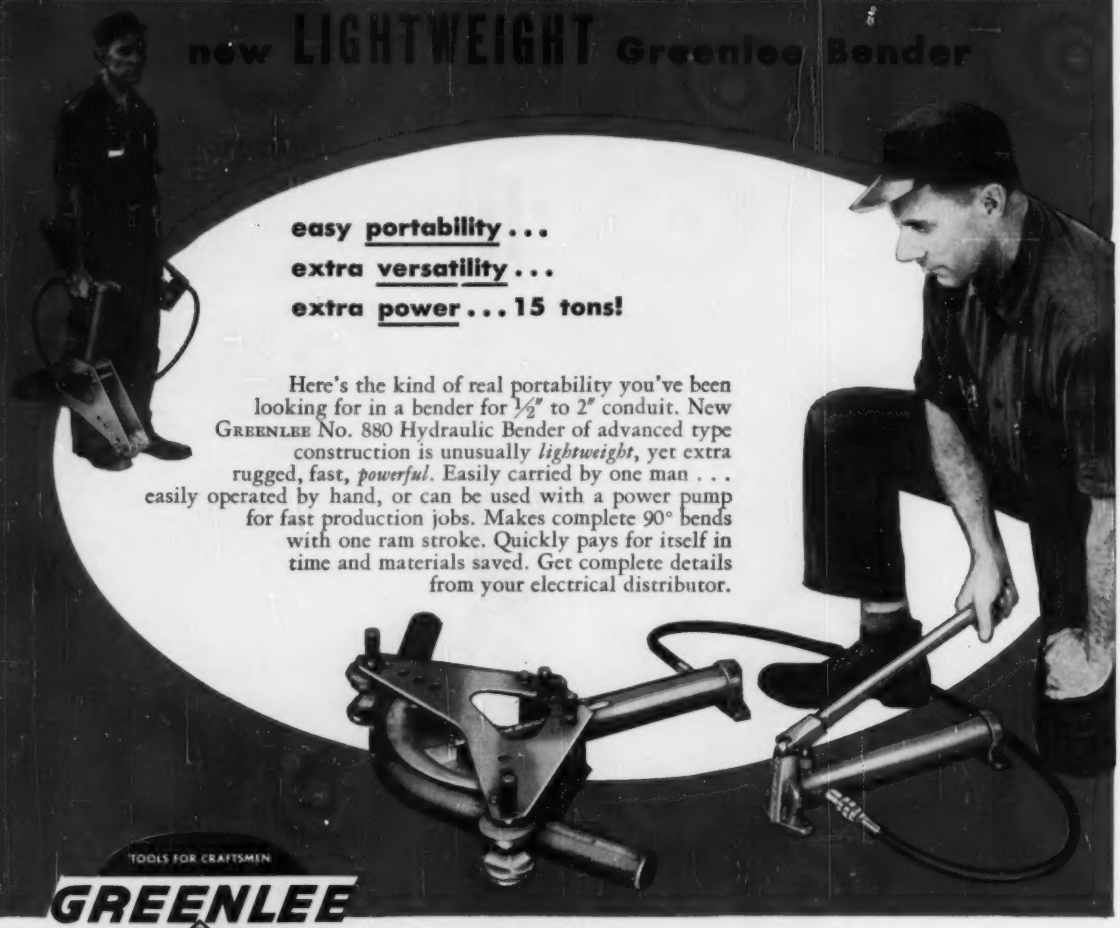
There's a complete line of Eversticks for all strain requirements. 15 sizes of 2-way—3-way—4-way types.

EVERSTICK ANCHOR CO., Fairfield, Iowa

Let Graybar complete the picture . . .

Graybar Everything Electrical Graybar Electric Company

new LIGHTWEIGHT Greenlee Bender



easy portability . . .
extra versatility . . .
extra power . . . 15 tons!

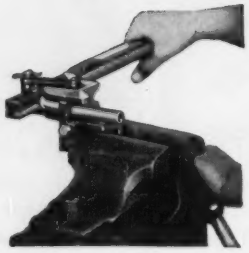
Here's the kind of real portability you've been looking for in a bender for ½" to 2" conduit. New GREENLEE No. 880 Hydraulic Bender of advanced type construction is unusually *lightweight*, yet extra rugged, fast, *powerful*. Easily carried by one man . . . easily operated by hand, or can be used with a power pump for fast production jobs. Makes complete 90° bends with one ram stroke. Quickly pays for itself in time and materials saved. Get complete details from your electrical distributor.

TOOLS FOR CRAFTSMEN

GREENLEE

Knockout Punches and Hydraulic Punch Driver

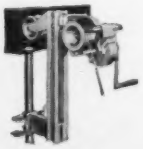
Quick, easy way to make knockout enlargements for ¾" to 4" conduit. Simply insert GREENLEE Knockout Punch in knockout or small drilled hole, then turn with an ordinary wrench. For an even faster, practically effortless operation, drive Punch with powerful, portable GREENLEE Hydraulic Driver shown below.



Hand Benders for Tubing

Swiftly produce accurate small-radius bends (up to 180°) in conduit, pipe, and tubing. No flattening or kinks. GREENLEE Hand Benders are especially designed to form neat bends to fit sharp corners, nooks, and other close quarters. Eliminates need for many manufactured bends and fittings. Various sizes and models . . . handy companion tools to GREENLEE Hydraulic Benders for quickly "custom making" your own complete conduit installations *right on the job.*

Boring Tools For quickly making clean, smooth openings for conduit and wiring. The GREENLEE line includes Electricians' Auger Bits and Electric-Drill Bits, Bell Hangers' Drills, Expansive Bits, and Bit Extensions.



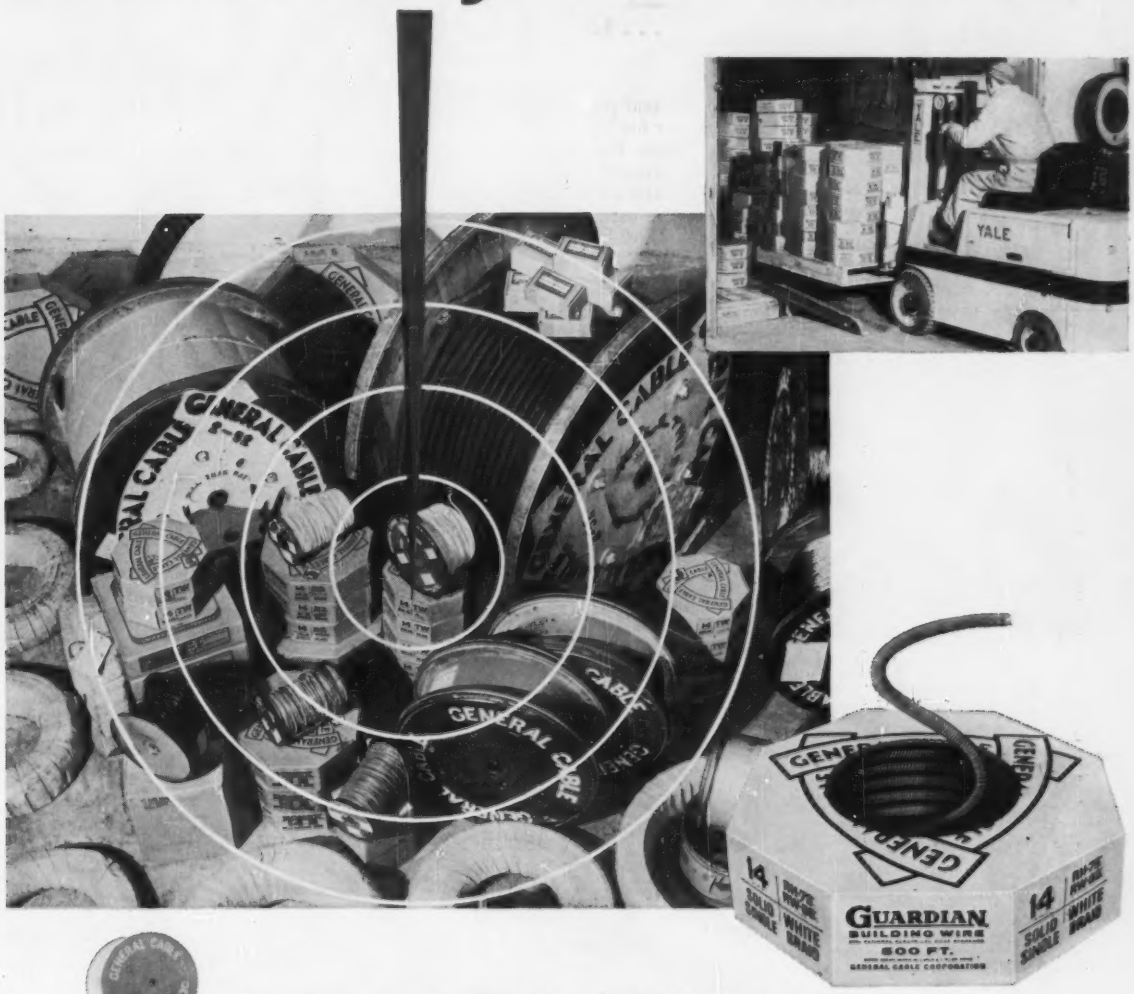
Cable Puller Easy-operating, compact unit for 7,500-pound pull. Fastens directly to conduit for pulling in line with conduit . . . no loosened hangers. Attachment available for concealed conduit work.

SEE YOUR ELECTRICAL DISTRIBUTOR. Get complete information on the above and other GREENLEE time-saving tools: Knockout Punches • Radio Chassis Punches • Anchor Screw Expanders • Chisels and Gouges • Spiral Screw Drivers • Electric-Drill Bits • Automatic Push Drills • and many more. Greenlee Tool Co., 1986 Columbia Avenue, Rockford, Illinois

Let Graybar complete the picture . . .

Graybar Everything Electrical Graybar Electric Company

GENERAL CABLE HITS THE TARGET on Delivery and Service!



Making your job easier and better, General Cable backs up distributors unconditionally with 'round-the-clock support, hits the target with quick delivery and dependable service on every job. GENERAL CABLE CORPORATION, 420 Lexington Avenue, New York 17, New York.

be specific . . . **specify GENERAL CABLE**

Let Graybar complete the picture . . .

Everything Electrical Graybar

Standard Pole Line Hardware

4,000 items . . . from arm to anchor

AVAILABLE FROM HUBBARD

And in a variety of materials. On many Hubbard items, you may specify Galvanized Steel, Galvanized Corten, Aluminum or Copper; as determined by the requirements of each installation.

Hubbard Pole Line Hardware either meets or exceeds the standards set by the leading trade associations and the largest operating companies.

Insulator Pins and Pole Top Fixtures

Insulators and Clevises

Transmission Hardware

Secondary Racks and Accessories

Pole and Crossarm Brackets

Wireholders and House Brackets

Street Lighting Standards, Equipment, Brackets

Next time you order pole line hardware . . . Call your Graybar Distributor for HUBBARD Hardware . . . *Quality* for more than a century.

HUBBARD AND COMPANY

Pittsburgh 1, Pa. • Chicago 50, Ill.
Oakland 8, Calif. • Dallas (Plano), Texas

Let Graybar complete the picture . . . .

Everything Electrical — Graybar Electric Company

How HAPCO Poles cut maintenance on the New York Thruway...

When the New York Thruway planners specified HAPCO Aluminum alloy lighting standards for the Tappan Zee Bridge, they specified the end of pole painting maintenance. For this most concentrated over-the-water lighting installation in the world posed a major maintenance problem due to its exposure to great amounts of moisture.

Solving the problem with 220 HAPCO tapered Aluminum Poles and 35 special HAPCO Lighting Brackets for mounting on the middle span was a no-maintenance investment. That's because HAPCO Aluminum Poles and Brackets are corrosion resistant. They require no initial or maintenance painting. Maximum structural strength is assured because HAPCO Poles are spun from Aluminum Alloy and Heat-treated. Their silver grey beauty blends with the most modern surroundings, provides the highest visibility for maximum safety.

What's more, HAPCO Standards are designed to fit your individual requirements. Your Hubbard representative will be glad to assist you in specifying the HAPCO Pole that exactly fits your needs. And they're available from more than 300 leading electrical distributors throughout the United States.

Free HAPCO Catalog

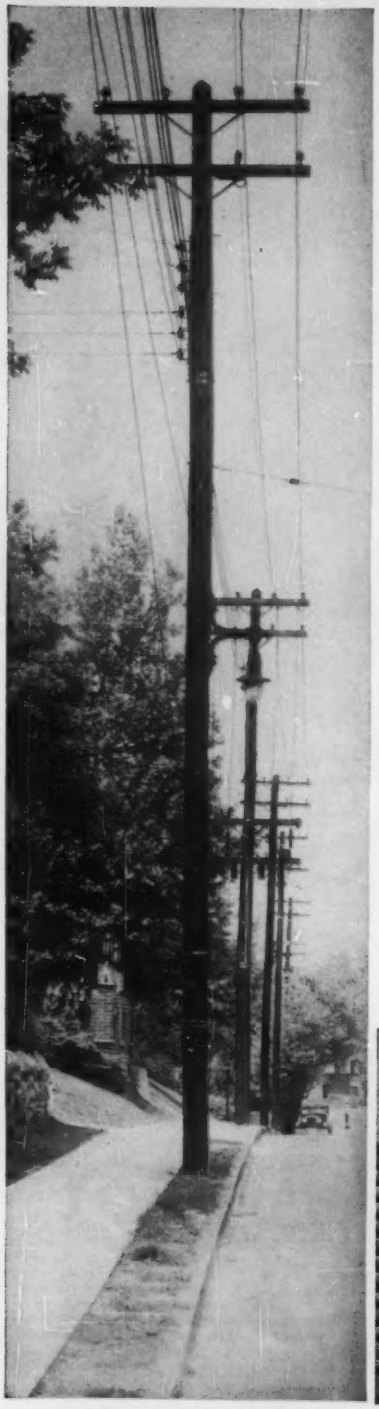
If you'd like more details on design features and specifications of the complete Hapco line, write for catalog HAL 754. It contains valuable information to help you plan the most efficient, most beautiful highway and street lighting, as well as any other outdoor lighting requirement. (Hubbard Aluminum Products Company, 6301 Butler Street, Pittsburgh 1, Pa.)

HUBBARD ALUMINUM PRODUCTS COMPANY
Division of Hubbard & Company, Pittsburgh 1, Pa.

Let Graybar complete the picture . . .

Graybar Everything Electrical Graybar Electric Company

DEPENDABLE



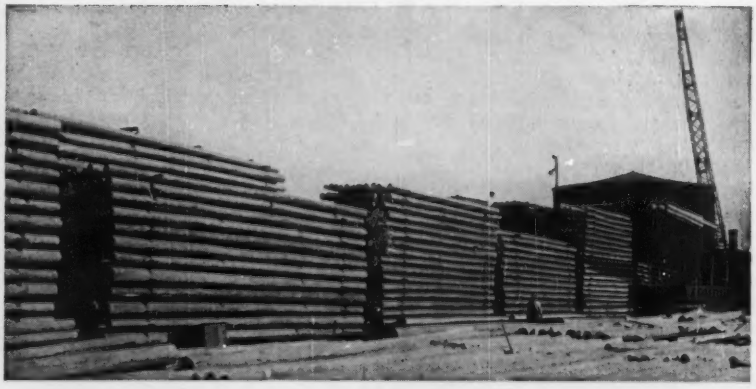
Poles

of
Selected Sound Timber
Scientifically Treated

THE lasting strength of International Creosoted Pine Poles plus their low ultimate cost makes them the safest and most economical poles that can be purchased. For more than 81 years, numerous service records of pole treatments have been utilized to perfect the present production practices for International Creosoted Poles. As a result of the lessons learned during this long experience, International Creosoted Poles will assure trouble-free, continuous service. Their straight, clean, smooth surfaces perfectly adapt them for street lighting, rural and urban distribution.

International Creosoted Pine Poles are manufactured and distributed by two of the oldest companies serving the utility industry. They have grown up together, ready always to serve with quality poles, framed correctly, and shipped when needed.

Distributed by Graybar Electric Company



INTERNATIONAL CREOSOTING & CONSTRUCTION CO.

PRODUCERS OF HIGH GRADE TREATED TIES, POLES, PILES, ETC.

Galveston — Beaumont — Texarkana

Let Graybar complete the picture . . .

Everything Electrical Graybar Electric Company

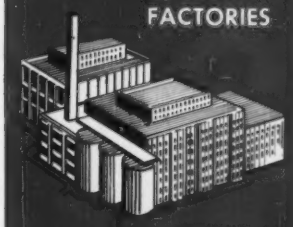
Speaking of Adequate Wiring

IT PAYS TO HAVE HUBBELL GOOD CONNECTIONS

THERE'S NO SUBSTITUTE FOR QUALITY, SAFETY, AND DEPENDABILITY

Adequate wiring standards can be maintained only if top quality wiring devices are specified. When you order from Graybar you can always be sure of this top quality as evidenced by the outstanding Hubbell devices shown below. To simplify your ordering, Graybar's pick-up counter is ready to serve you. Just telephone your order. The material will be waiting at the pick-up counter.

FACTORIES



COMMERCIAL BUILDINGS

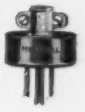
SCHOOLS AND INSTITUTIONS

HOMES

CAT. NO. 7311
Twist-Lock
Never disconnects accidentally
CAT. NO. 7313

3-Wire Grounding Receptacles

CAT. NO. 5262

3-Wire, U-Shaped Grounding Caps

CAT. NO. 5264

Topper
AC Quiet Switches
CAT. NO. 1221

designed for control of fluorescent lighting

Hubbellock

CAT. NO. 20415
CAT. NO. 20414

Heavy Duty Connectors

Topper
AC Switches

CAT. NO. 1201
Designed for fluorescent lighting

Hubbellette
AC Switches

CAT. NO. 1161 SL
for multiple switching when space is limited

T-Slot Outlets

CAT. NO. 7550
Side wiring convenience

Twist-Lock

CAT. NO. 7310
Flush Receptacles

Grounding-Type Convenience Outlets

CAT. NO. 5262
accommodate U-shaped caps

Weatherproof Covers

CAT. NO. 5260
for outdoor connections

Duplex Convenience Outlet

CAT. NO. 9260
Double T-Slot

Twist-Lock Receptacles

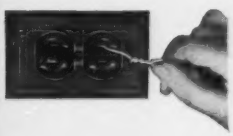
CAT. NO. 7517
for manual training rooms, etc.

Safety Receptacle

CAT. NO. SP-49

Topper
AC Key-Type Quiet Switches

CAT. NO. 1201L
. . . for authorized control of lighting installations

Safety Receptacle

CAT. NO. SP-49
Protects children from accidental shock.

Weatherproof Outlet

CAT. NO. 7420
For electrical living out-of-doors

Grounding-Type Receptacles

CAT. NO. 5252
For laundry, workshop, kitchen, etc.

30 Amp. Power Outlet

CAT. NO. 9390
For dryers, air conditioners, etc.

Pacemaker Jr. Switches

CAT. NO. 1181 SL
Space saving—quiet—economical

Let Graybar complete the picture . . .

Everything Electrical Graybar Electric Company

Serving Industry "Since 1857"

Since the first wires were strung, Klein has been the leading supplier to the electrical industry for tools and equipment specifically designed for communication and power lines.

Today, through your Graybar supply house, you can secure practically anything you need from the complete Klein line. Below are listed a few of the popular Klein items available.

Pliers
Klein Side-Cutting Plier

Cat. No.	Size
201-5	5"
201-6	6"
201-7	7"
201-8	8"
201-9	9"

Klein Side-Cutting Plier N.E. Type (Streamlined)

Cat. No.	Size
201-5 N.E.	5"
201-6 N.E.	6"
201-7 N.E.	7"
201-8 N.E.	8"
201-9 N.E.	9"

*Klein Kut High-Leverage Plier N.E. Type (Streamlined)

Provides easy cutting of weatherproof hard-drawn copper wire up to No. 2. Can be used for A.C.S.R.

Cat. No.	Size
213-9 N.E.	9"
213-9 Standard Type	9"

*Trade-Mark

Narrow-Nose Oblique-Cutting Plier

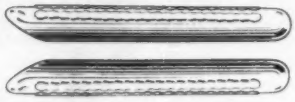
Cat. No.	Size
202-5	5"
*202-5C	5"
202-6	6"
*202-6C	6"

Klein Long-Nose Side-Cutting Plier

Cat. No.	Size
203-5	5"
*203-5C	5"
203-6	6"
*203-6C	6"
203-7	7"
*203-7C	7"

*These pliers have coil spring to keep jaws in open position.

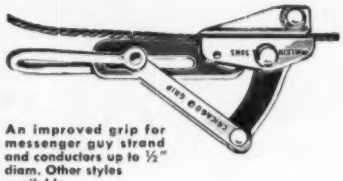
Plastic Handles



Plastic covers provide a non-skid grip and assure greater comfort when used on Klein Pliers. Made of transparent plastic in bright maroon.

Cat. No.
60 to fit 6" pliers
70 to fit 7" pliers
89 to fit 8" and 9" pliers

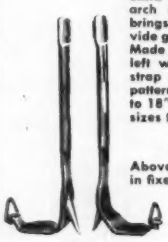
Chicago Grips



An improved grip for messenger guy strand and conductors up to ½" diam. Other styles available.

Cat. No.
1628-5

Climbers



Klein "Pole Master" Climbers have extra wide stirrups to give more arch support. An offset shank brings gaff in proper line to provide greater security and comfort. Made in matched pairs right and left with drop forged triangular strap rings at ankle. Adjustable pattern may be adjusted from 15" to 18" in ½" increments. Special sizes to order.

Cat. No.
1945 A D J

Above climbers may also be had in fixed length pattern.

Lineman's Wrench

Drop forge wrench of alloy steel. Openings: Large end—1 3/32" and 29/32" Small end—13/16" and ⅞"

Cat. No.	Size
3146	13" for ⅝" hardware

Lineman's Belt

A de-luxe belt of finest harness leather with a sliding trace of famous "Klein-Kord." Soft latigo leather cushion for comfort.

Cat. No.
5249 with standard "D" rings width 4¼"

Self-Locking Block Tackle

Steel shell blocks galvanized, fitted with snubbing hook to lock load in any position. May be used with two grips attached to the snaps or with drop forged hook.

Cat. No.
1802-30

Furnished with 25' ⅜" rope and detachable anchor hook.

"Klein-Kord" Nylon Strap

Made of multiple plies of strong, finely woven nylon bonded together with frictioning and vulcanized in neoprene.

Cat. No.	Size
5294	1¾" x 5'8"

Skinning Knife

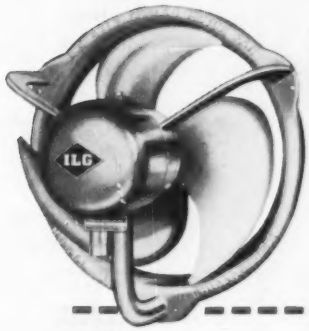
High-quality skinning knife with plastic insulated handle. Back of blade ground flat for scraping. Ring for fastening to snap.

Cat. No.	Length overall	Blade
1570-3	8"	3"

Mathias Klein & Sons
Established 1857
7200 McCORMICK ROAD • CHICAGO 45, ILLINOIS
Chicago, Ill., U.S.A.

Let Graybar complete the picture . . .

Everything Electrical Graybar Electric Company



TYPE "P"—high speed, maximum air volume within minimum dimensions. For use on systems up to .6" static pressure. Self-cooled motor. 4 sizes.

maintain an

"Air of Efficiency"

with

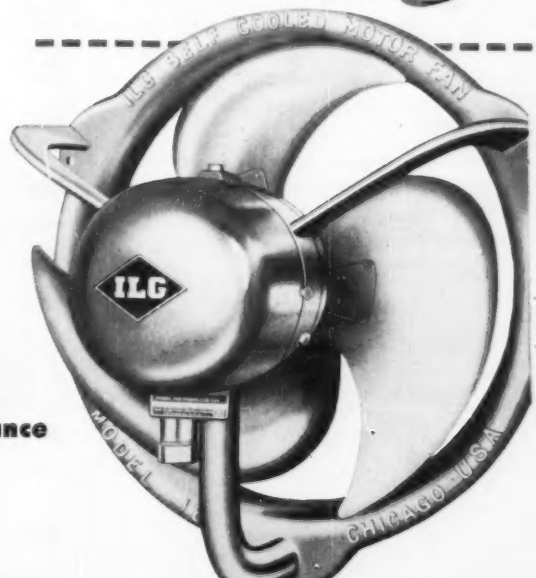
TYPE "W"—for large diameter wheels, 60" to 72" sizes. Dynamically balanced wheel. Rigid, sturdy frame. Self-cooled motor.

ILG

PROPELLER FANS

• faster air change • minimum maintenance

• lower power costs



TYPE "Q"—powerful, quiet, efficient . . . plus long life, minimum maintenance. Self-cooled motor. 6" to 48" diameter wheels.

Efficient operation calls for efficient ventilation . . . ILG ventilation! Equipped with self-cooled motors, Ilg Propeller Fans assure you longer, trouble-free, dependable performance. Rated and certified under standard testing codes, you can count on Ilg Fans to move more air. Dynamically balanced fan wheel, direct-connected to motor, assures smooth, quiet, free-running operation. And Ilg's famous "one-name-plate" guarantee covers both fan and Ilg-built motor as a unit.

You can choose an Ilg Fan from a complete range of sizes . . . 6" to 72". And you can expect fast delivery, too, because adequate stocks of Ilg Fans are maintained everywhere. You'll find experienced ventilating experts in all principal cities . . . ready and able to solve your air-moving problems. See your dealer, or write . . .

TYPE "X"—has TYPE "Q" wheel and ball bearing, explosion-proof motor. Non-ferrous frame. 16 capacities.

ILG ELECTRIC VENTILATING CO.

2850 N. Pulaski Road, Chicago 41, Illinois

Let Graybar complete the picture . . .

Graybar Everything Electrical GraybaR Electric Company

LABORATORY CONTROLLED...

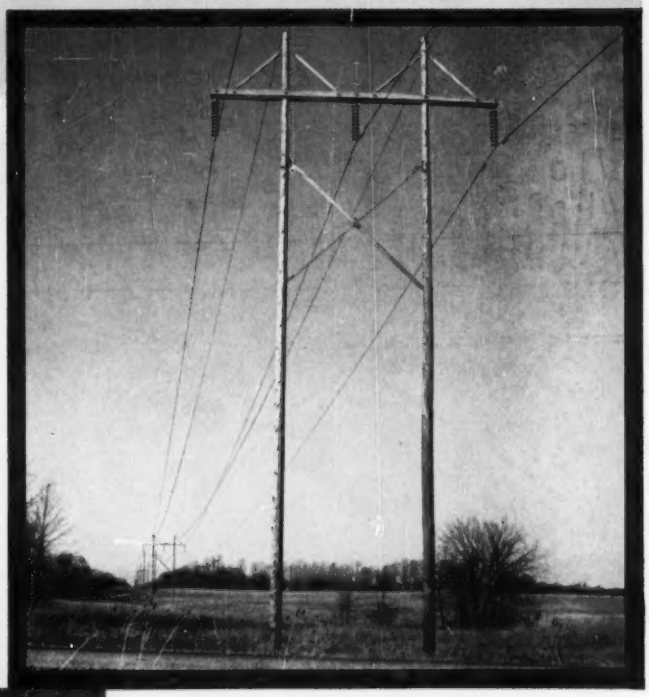
Crapo

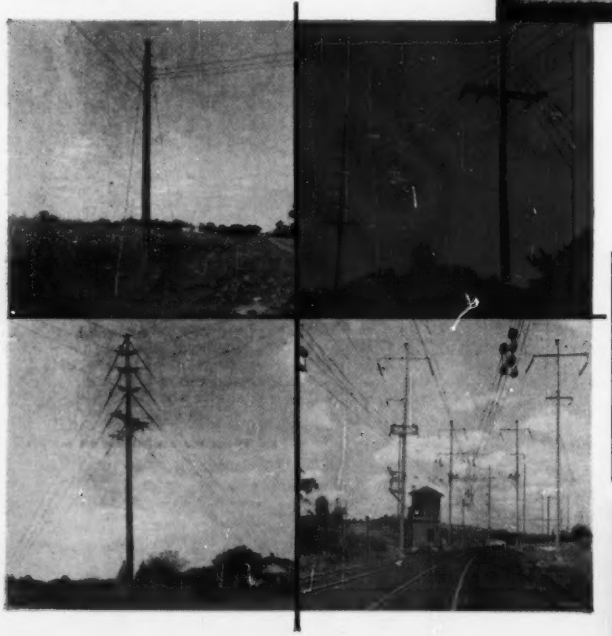
GALVANIZED STEEL STRAND

Your assurance of finest quality, dependability

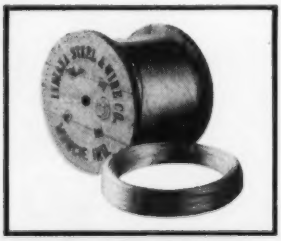
Close laboratory control of each grade and size of Crapo Galvanized Steel Strand has established this as a product of high quality in the industry. You benefit through maximum strength and dependability of the finished strand.

The Crapo Process of applying heavy, uniform, dense coatings of commercially pure zinc, withstands the punishment of construction and provides maximum resistance to corrosion.





OVERHEAD GROUND WIRE . . . from CRAPO Weldless Galvanized Steel Strand.



Here is the most practical and economical strand designed for shielding and protecting transmission lines against lightning. Produced in continuous lengths, Crapo Weldless Strand has no welds or joints in the individual wires or finished strand. Maximum strength and high fatigue endurance provide that extra safety factor so necessary in overhead ground or static wire.

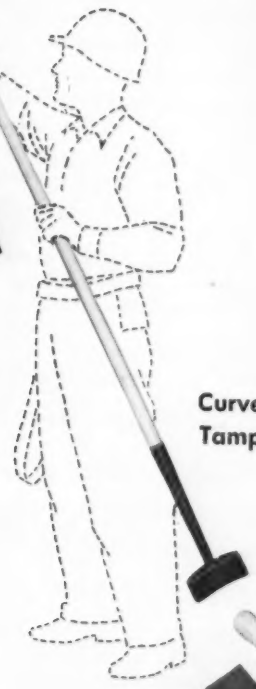
INDIANA STEEL & WIRE CO., INC.
Muncie, Indiana

Let Graybar complete the picture . . .

Graybar Everything Electrical Graybar Electric Company

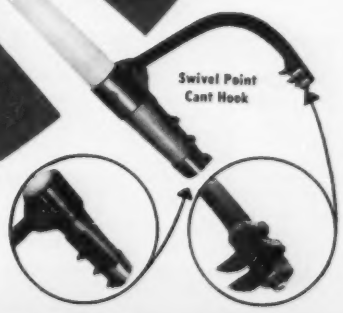
It Pays to have the Right Equipment

ANY LINEMAN is a better lineman with the superior design and quality of *Oshkosh Tools*



Curved Head Tamping Bar

Extension Ladders
Pictorial Ladders
Climbing Hooks
Gaffs
Pevies
Cant Hooks
Shovels
Digging Bars
Pike Poles
Pike Pole Guards
Pole Supports
Tamping Bars
Spoons
Rods
Tree Trimmers
Pole Cradle
Folding Barricades



Swivel Point Cant Hook

OSHKOSH

POLE LINE TOOLS

LEACH COMPANY • OSHKOSH, WISCONSIN

Since 1887

Let Graybar complete the picture . . .

Everything Electrical Graybar Electric Company

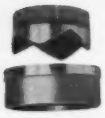
NYE

The only **KNOCKOUT PUNCH** *with the*

FOUR **POINT**

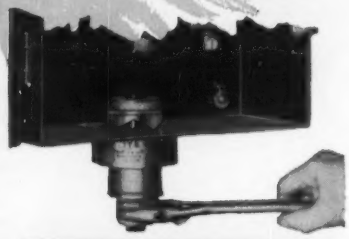
TIGER BITE

CUTS 4 TIMES FASTER



Here's the bite that means business . . . a four-point *tiger-bite* that powerfully drives four relentless blades into metal . . . cuts cleanly, leaves no burrs, needs no reaming, insures a smooth-rimmed hole every time. And with one-fourth the effort, in one-fourth the time ordinarily required. No wonder this great NYE punch pays for itself in a big hurry, and nets you continuing dividends thereafter. Try it . . . you'll buy it . . . and be glad!

- Four cutting points provide greater shear angle for easier cutting.
- Ball bearing chuck-in-hand sets eliminates steel on steel friction thus producing a fast, easy cut . . . lessens strain on wrench and operator.
- Cuts clean, burrless holes, eliminating reaming edges.
- Metal slug easily removed — no prying or forcing necessary.
- Ideal for operating in close quarters.
- The coarse thread on the drive screw (12) against others (24) lessens cutting operation 50%.



HAND OPERATED MODEL
IN 4 SETS - 10 SIZES

MODEL NO.	PIPE SIZE HOLE	STEEL THICKNESS
N½MS*	½"	⅛"
N1MS	¾"-1"-1¼"	$\frac{5}{32}$"
N2MS	1½"-2"-2½"	$\frac{3}{16}$"
N3MS	3"-3½"-4"	$\frac{3}{16}$"

*packed in separate boxes, one punch to a box

NYE PUNCHES ARE MADE OF THE HIGHEST GRADE STEEL AND ARE ENGINEERED TO DO THE BEST POSSIBLE WORK

for ADDED POWER *and* EASIER OPERATION

CHOOSE THE NYE HYDRAULIC KNOCKOUT PUNCH

HYDRAULIC PUNCHING. The NYE Hydraulic Punch Driver does the finest knockout work with practically no human effort. Produces a clean hole quick! CUTS A 4" STANDARD PIPE SIZE HOLE THROUGH ¼" STEEL IN 32 SECONDS! Drives smoothly, surely . . . greatly aids in promoting fast production of burrless holes. Simple to operate. The NYE Hydraulic Pump is adaptable to all types of Hydraulic Jacks, Ram Pullers and Benders.

See your DISTRIBUTOR or write for more information!

HYDRAULIC FEATURES:

IN 3 SETS - 10 SIZES

MODEL NO.	PIPE SIZE HOLE	STEEL THICKNESS
N1HS	½" ¾"-1"-1¼"	⅛" $\frac{5}{32}$"
N2HS	1½"-2" 2½"	¼"
N3HS	3"-3½"-4"	¼"

- Patented coupler in RAM connecting piston and cutter prevents damage to piston and punch.
- High pressure coupler tested to 24,000 p.s.i.
- Six feet of high pressure 10,000 lb. hose tested for 24,000 lbs. bursting pressure.
- Capacity of rams: #1—10 ton, #2—20 ton, #3—25 ton.
- A pump that develops 10,000 lbs. p.s.i.
- Each set has own special Ram.

NYE

NYE TOOL COMPANY

4122 FULLERTON AVENUE
CHICAGO 39, ILL.

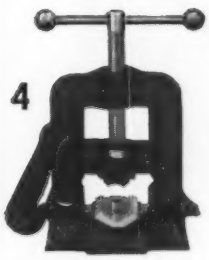
Let Graybar complete the picture . . .

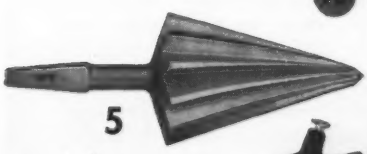
GRAYBAR Everything Electrical GRAYBAR ELECTRIC COMPANY

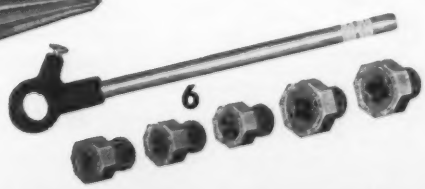
NYE

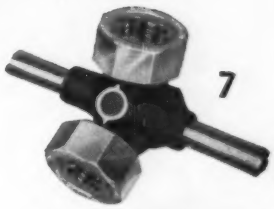
Your BEST TOOL Buy!

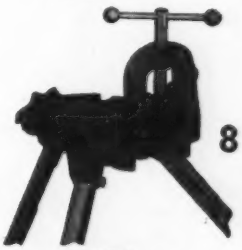
Best because of the 50-years experience that's factory-built into every NYE tool to assure perfect operating efficiency on the job . . . And *best* because they're designed to perform ruggedly, dependably and economically *always!* You're bound to like a NYE tool.

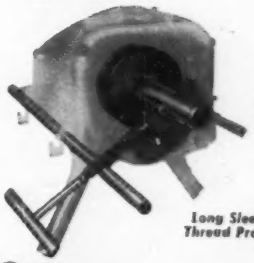












Long Sleeve for Thread Protection

1. **NYE NO. 51B RATCHET PIPE THREADER**
   PAT. NO. 2629886. Cuts either Conduit or Pipe Threads. Opens automatically on both power and hand operation. Cannot jam. Can readily be changed for 1" thru 2" sizes . . . 300 times faster!
2. **NYE TRIPLEX SOLID DIE STOCK**
   For Conduit or Pipe Dies. Lightweight, ideal for threading machines. Openings in stock excellent for chip clearance and easy oiling.
3. **NYE TUBE CUTTERS WITH ROLLERS**
   Recommended for Copper, Aluminum and other non-ferrous metals. $\frac{3}{16}$"-1⅛" O.D. Also malleable Tube Cutters up to 2".
4. **NYE SELF-LOCKING VISES**
   Equipped with Long Jaws. Sizes ranging from ⅛"-4½".
5. **NYE BIT BRACE REAMER**
   Spiral Flutes with tapered shank to fit any standard bit brace.
6. **NYE TRIAD STOCKS**
   PAT. NO. 1752915. Can be furnished for Conduit or Pipe Threads ⅛"-¾" . . . ⅛"-1¼". Reversible for threading short nipples or a stud of pipe. Exclusive with Nye, the *SKIP TOOTH* die.
7. **NYE THREE WAY TRIAD STOCKS**
   Uses same dies as the RATCHET STOCK. ⅜" to ¾" and ½" to 1".
8. **NYE COMBINATION VISE STAND**
   Base designed so yoke vise parts (⅛" to 2½") can be replaced by chain vise parts (½" to 4"), or vice versa. Legs lock in open or closed position.
9. **NYE HEAVY DUTY PIPE CUTTER**
   For use with power units. PAT. NO. 2556974. Three Roller Balancing. This self-aligning feature assures square cuts and eliminates spirals. Malleable sleeve covers and protects handle threads.
10. **NYE PIPE WRENCHES**
    Special lightweight alloy malleable handle; forged jaws. 50 years of experience in design and manufacturing behind them.

SEE YOUR DEALER . . .
OR WRITE US

"The Tools You Swear By... Never At!"

NYE

NYE TOOL COMPANY
4122 FULLERTON AVENUE
CHICAGO 39, ILL.

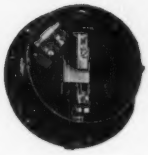
Let Graybar complete the picture . . .

Graybar Everything Electrical Graybar Electric Company

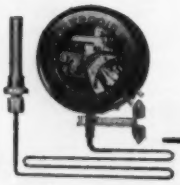
MERCOID®
CONTROLS
FOR INDOOR, OUTDOOR OR EXPLOSIVE ATMOSPHERES

DIFFERENTIAL PRESSURE CONTROLS
For High Pressures

PRESSURE CONTROLS
30" Vac. to 2500 P.S.I.

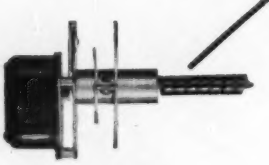


DIFFERENTIAL PRESSURE CONTROLS
For Low Pressures



REMOTE STEM TEMPERATURE CONTROLS
For Temperatures—30° to 530°

TRANSFORMER-RELAYS
Single and Multiple Circuits



AIR TYPE TEMPERATURE CONTROLS
For Temperatures To 650°

LIQUID LEVEL CONTROLS
With Packing Gland Or Torque Rod Construction

For Protection Against
Explosive Atmospheres, Weather, Vapors

APPLICATION: Mercoid Controls are adaptable to a wide range of applications involving the control of pressure, temperature, liquid level or mechanical movement.

ELECTRICAL CONTACT: Mercoid Controls incorporate sealed mercury switches which are impervious to dust, dirt and corrosion. These switches can give a million operations without deterioration.

CIRCUIT ARRANGEMENTS: There are any number of special circuits available to meet your particular problem.

OPERATING RANGES—SENSITIVITY: Mercoid Controls are available in many ranges with the sensitivity your application requires.

CONSTRUCTION: Standard type instruments are furnished with steel case. Special cases and housings are available for protection against weather, excess vapors, splashing or explosive atmospheres.

If you have a control or mercury switch problem send details to our engineering department.

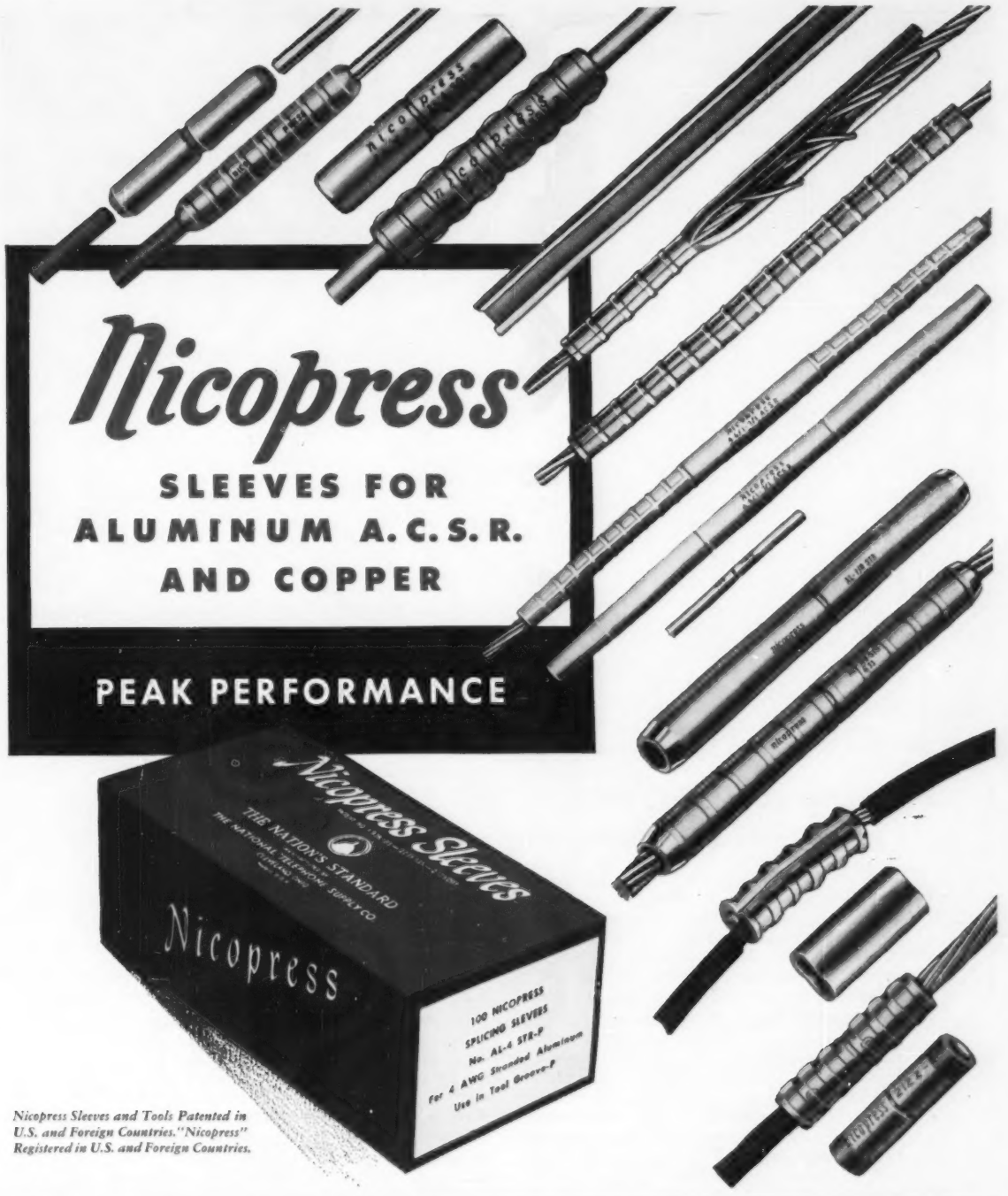
Write for Catalog No. 7008

THE MERCOID CORPORATION, 4201 BELMONT AVE., CHICAGO 41, ILLINOIS

NEW YORK, 205 EAST 42nd STREET — PHILADELPHIA, 3137 N. BROAD STREET

Let Graybar complete the picture . . .

Everything Electrical Graybar



Nicopress Sleeves and Tools Patented in U.S. and Foreign Countries. "Nicopress" Registered in U.S. and Foreign Countries.

The National Telephone Supply Company

5100 SUPERIOR AVENUE • CLEVELAND 3, OHIO

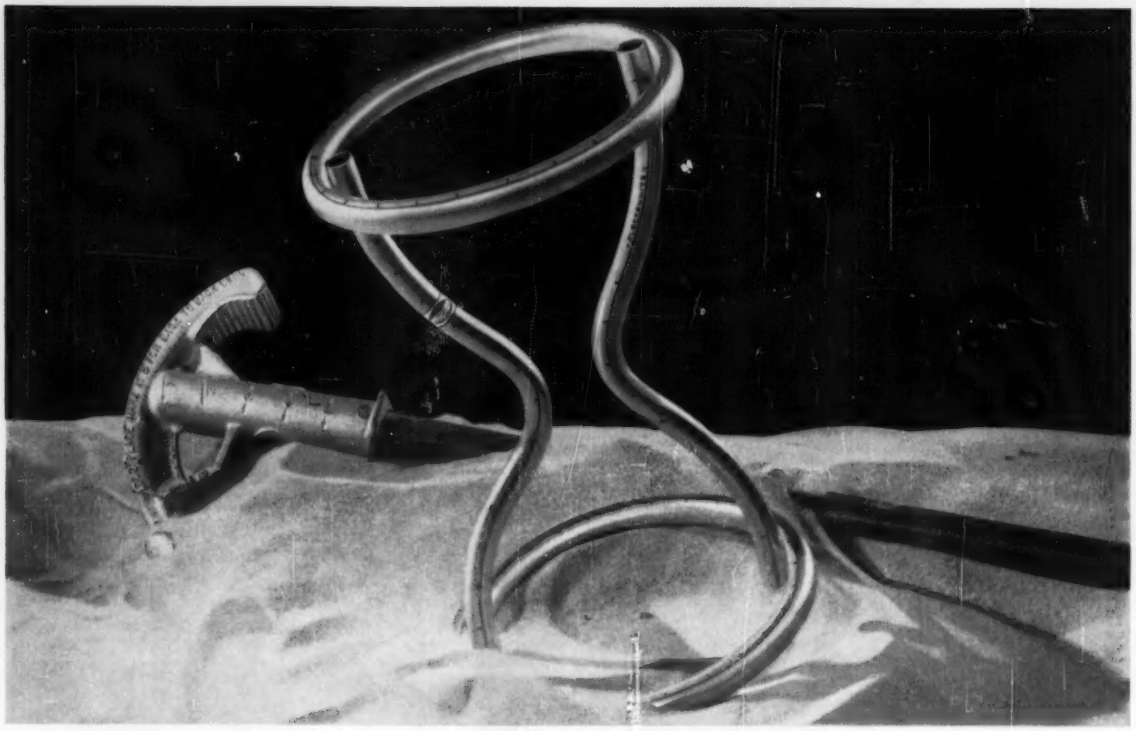
Canadian Mfr.: N. SLATER CO., LTD., HAMILTON, ONTARIO, CANADA

Export Distributor: INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

THE NATIONAL TELEPHONE SUPPLY COMPANY

Let Graybar complete the picture . . .

Everything Electrical Graybar Electric Company



A BEND IN LINE SAVES TIME...

Republic ELECTRUNITE® E.M.T. goes in fast

It goes in fast . . . and it goes in to stay.

Even after ten . . . fifteen . . . twenty . . . twenty-five years of service, utilities report that Republic ELECTRUNITE E.M.T. is still providing trouble-free protection for their electrical systems. And in concrete jobs, where hundreds of millions of feet have been installed, results are equally good.

Fast installation is another of Republic ELECTRUNITE E.M.T.'s big advantages. A longitudinal Guide-Line helps keep bends in the same plane, avoid costly delays. There's no kinking . . . no wrinkling . . . even when bends are a full 90°—because ELECTRUNITE is *uniformly ductile.* Furthermore, it's lightweight and easier to handle . . . which further reduces costs.

You get additional savings because there are no threads to cut, no runs to turn. Every joint becomes a union. And since threading is unnecessary, the tightly adhering galvanized coating remains unbroken—assuring permanent end-to-end circuit protection from corrosion.

Check further into the cost advantages of Republic ELECTRUNITE E.M.T.—the electrical circuit that provides many money-saving installation helps like the "Inch-Marked"® and "Guide-Lined" features. It's produced to ASA Specification C-80.3. Federal Specification WW-T-806 and carries the Underwriters' Laboratories Seal of Inspection. Write for all the facts. *Send for your free copy of 84-page ELECTRUNITE bending instruction booklet.*

REPUBLIC STEEL

Steel and Tubes Division
213 East 131st Street • Cleveland 8, Ohio

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

Let Graybar complete the picture...

Everything Electrical Graybar Electric Company

made together to work together . . .

Shown on this page are a few members from the O-B family of hardware and insulator products for distribution lines.

As in any good family, you'll find a certain "togetherness" of design and materials. This togetherness starts on the drawing board. Often the same man works on both insulators and hardware. Or the man who designs the insulator is just across the aisle from the man who designs the hardware. This gives insulators and hardware a chance "to grow up" together.

A close relationship continues through the manufacturing process. Always the hardware-insulator relationship is considered as a unit, because we know they will serve on your lines as a unit.

The same togetherness applies to hardware components. Despite the numerous combinations of materials, there are no misfits. Balls go with sockets. Clevises and tongues always match.

Items that are designed and made together, work better together on your lines. That's why we recommend going to Graybar for O-B distribution hardware and insulators. You'll be sure of getting materials that fit every time, materials that will perform as effective units in your distribution system. Call on Graybar for these materials that were made for each other.

Distributed by Graybar ELECTRIC COMPANY

Ohio Brass

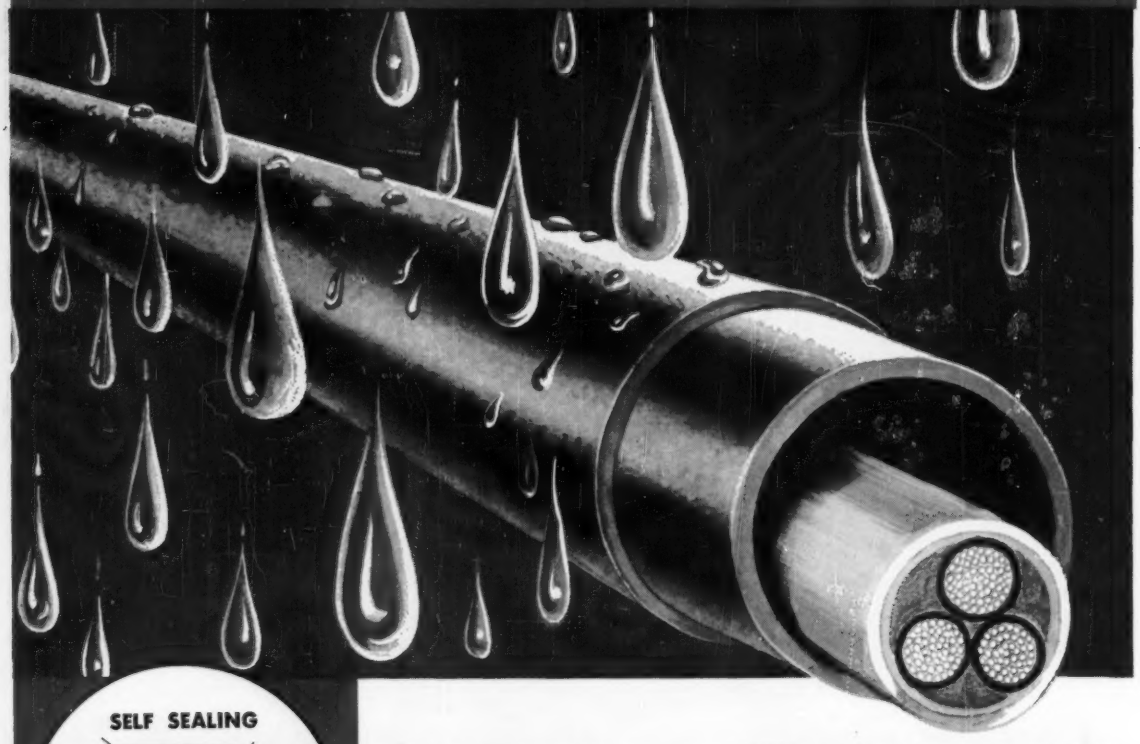
MANSFIELD OHIO, U.S.A.

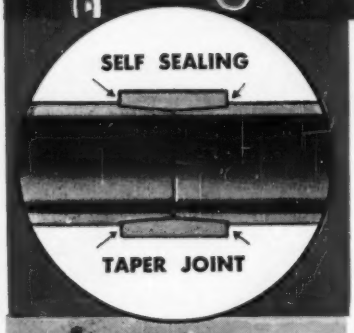
4672-H

Let Graybar complete the picture . . . .

Everything Electrical Graybar ELECTRIC COMPANY

WATERTIGHT!





Orangeburg Fibre Conduit Prolongs Cable Life

Keep out corrosive ground waters, and you prolong the life of underground cables, say utility engineers!

Why? Because ground waters containing corrosive elements derived from the soil and concrete encasement attack cable sheath and shorten cable life. Orangeburg's impermeable wall and self-sealing Taper-Sleeve Joint shed them *"like water off a duck's back."* You get maximum protection with Orangeburg.

Orangeburg protects cables in many other ways. Smooth bore, low co-efficient of friction reduce incidence of abrasion. Its material is strong, tough, resilient, durable.

No other conduit is easier to install

Light, 8-foot lengths and a complete line of bends and fittings speed installation. Taper-Sleeve Joints tap water-tight in a jiffy. Orangeburg lays faster and at lower cost than any other type of conduit.

Orangeburg Fibre Conduit has prolonged cable life at minimum expense for utilities, municipalities and industry since 1893.

WRITE DEPT. EW-66A FOR CAT. 52

ORANGEBURG MANUFACTURING CO., INC., Orangeburg, N. Y. **West Coast Plant, Newark, Calif.**

ORANGEBURG®
FIBRE CONDUIT

Let Graybar complete the picture . . .

Graybar Everything Electrical Graybar Electric Company

FEATURE FIXTURES FOR 1956

THE ARTHUR A & B 14000 SERIES

A versatile direct-indirect luminaire for individual or end-to-end pendant mounting. The Arthur is available in 4-foot and 8-foot lengths, in 2 or 4-lamp models. Trim, shallow lines, all white finish, diffused polystyrene side panels and 35° x 35° shielding.

THE GARFIELD A & B 13000 SERIES

The 2 and 4-lamp Garfield is a companion unit to the Arthur, except that it has been especially designed for surface mounting. The long, low lines give it a "built-in" look and make it ideal for surface mounting on low ceilings. Diffusing polystyrene side panels and 35° x 35° shielding.

Pittsburgh Permaflector

Pittsburgh Permaflector Fluorescent Luminaires are the *first* choice among men who recognize the need for versatility and flexibility in lighting equipment. That's why so many of today's buildings are illuminated with Pittsburgh Permaflector Equipment. In Pittsburgh Luminaires you find modern styling, plus high overall efficiencies . . . and you find a *complete* selection of equipment that is economical in initial cost, easy to install and maintain, and gives maximum efficiency through its long service life.

WRITE The 12-page Bulletin N tells the full story of the gracefully styled Garfield and Arthur Luminaires for direct or indirect lighting.

PITTSBURGH REFLECTOR COMPANY

408 OLIVER BUILDING, PITTSBURGH 22, PA.

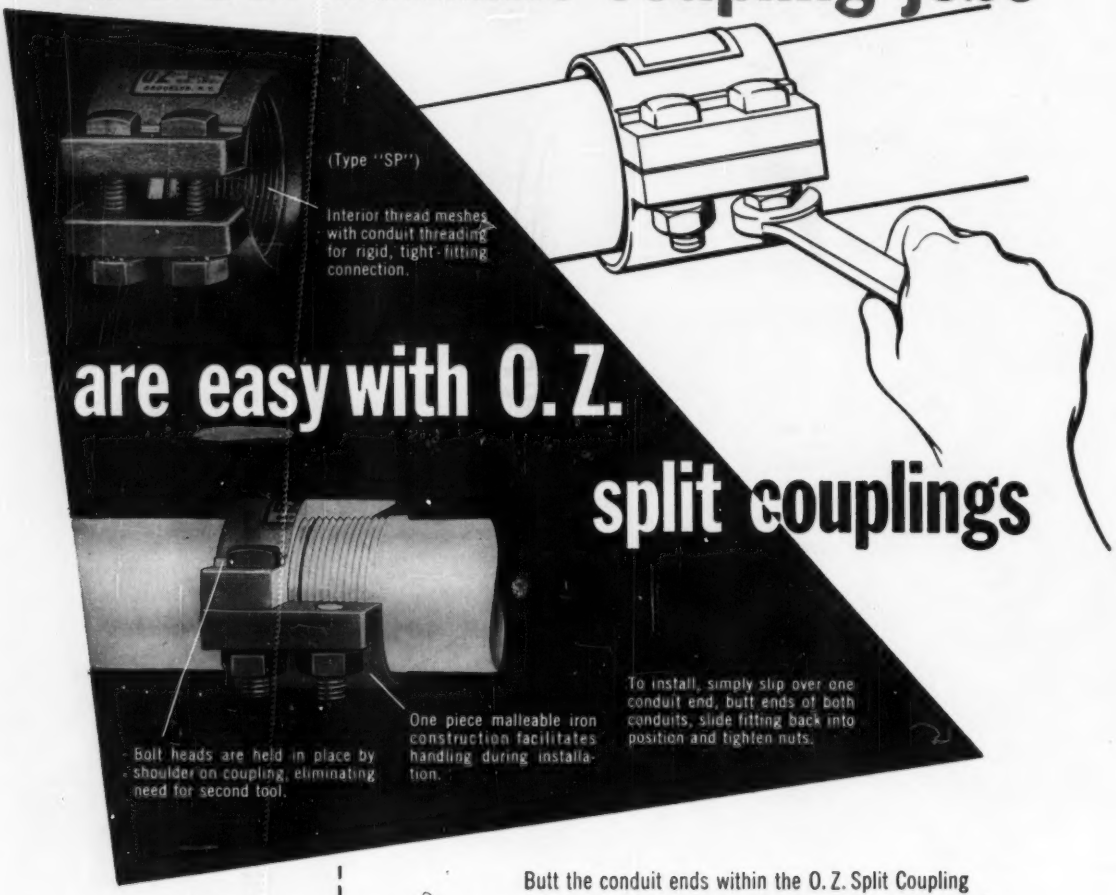
In Canada: Holden Lighting Ltd., 105 Tycos Drive, Toronto

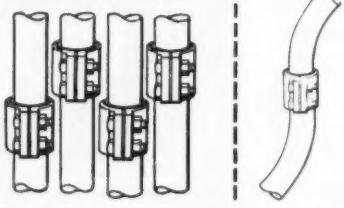
REPRESENTATIVES IN PRINCIPAL CITIES • WHOLESALERS EVERYWHERE

Let Graybar complete the picture . . .

Everything Electrical Graybar Electric Company

*"TOUGH" conduit coupling jobs


(Type "SP")
Interior thread meshes with conduit threading for rigid, tight-fitting connection.
are easy with O. Z.
split couplings
Bolt heads are held in place by shoulder on coupling, eliminating need for second tool.
One piece malleable iron construction facilitates handling during installation.
To install, simply slip over one conduit end, butt ends of both conduits, slide fitting back into position and tighten nuts.



Butt the conduit ends within the O. Z. Split Coupling —tighten two nuts with an ordinary open-end wrench and presto . . . you have a permanent, close-fitting, rigid connection.

Drastically reduced installation costs, plus initial savings of as much as 50% in larger sizes, over similar competitive fittings, are just two of the many reasons why you should specify O. Z. Split Couplings for your difficult conduit coupling jobs.

Call your local O. Z. distributor . . . he is ready to make immediate delivery from stock on sizes from ½" to 5".

* **"Tough"**—(Where ordinary couplings can't be installed). Are clearances close—near floor, wall, ceiling or other obstructions? Can conduits be turned due to bends? Is space or accessibility a factor? Just install an O. Z. Type "SP" Split Coupling.

CHICAGO OFFICE AND WAREHOUSE: 406 So. Cicero Ave. • ESterbrook 9-0326
SAN FRANCISCO PLANT: 749 Bryant St. • GArfield 1-7846

O. Z. ELECTRICAL MANUFACTURING CO., INC.
262 BOND ST. • BROOKLYN 17, N.Y.
CAST IRON BOXES • SOLDERLESS CONNECTORS
CABLE TERMINATORS • GROUNDING DEVICES
POWER CONNECTORS • CONDUIT FITTINGS

Let Graybar complete the picture . . .

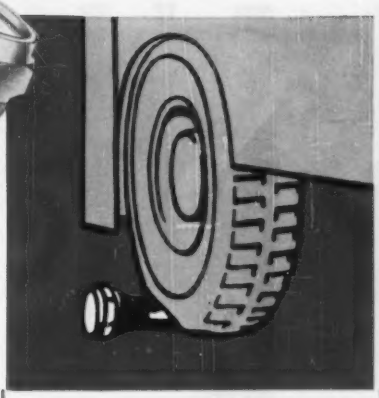
Everything Electrical — Graybar Electric Company

NEW heavy-duty nylon RAY-O-VAC flashlight!

"WORKMAN"
No. N22—2-cell
No. N32—3-cell

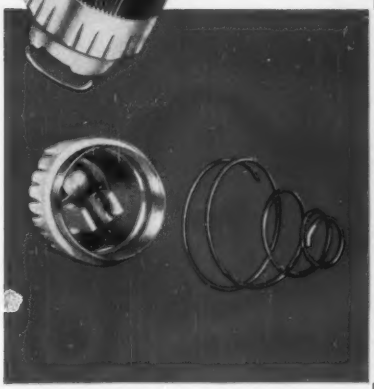
nylon
shortproof
industrial
flashlight

NEW all-nylon case... new advanced design... tops for industrial use!

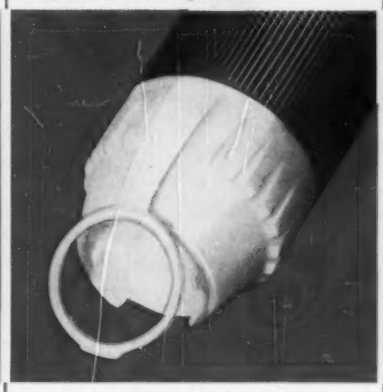


Rugged case... a new high in resistance to breakage, heat, cold, gas, oil, chemicals. Lightweight, pocket-formed, no exposed metal to cause flashlight shorts.

New exclusive easily replaceable switch ends greatest cause of flashlights being discarded. All parts replaceable over and over... life extended indefinitely.

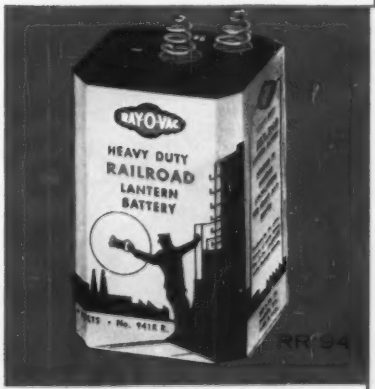


Your men will like this step-saving feature—the removable end cap has molded nylon clip in base to hold spare lamp.



Tough nylon ring hanger is molded part of end cap. When not in use, hanger clips into lower end of cap.

New Ray-O-Vac Leak Proof Industrial Batteries. Sealed-in-steel. Longer usable bright light. Guaranteed against corrosion.



New improved lantern battery specially designed for rough, tough yard use. More than meets specifications of railroads and U.S. Bureau of Standards. Heavy coil spring terminals.

Here is the really better industrial heavy-duty flashlight you've been looking for! Every detail has been redesigned and reconstructed for toughest industrial use. The "Workman's" new all-nylon case is featherlight, yet far tougher than steel. No exposed metal parts to create flashlight shorts and reduce the life of batteries. Every part replaceable for lifetime wear in any service. Lacquered aluminized reflector gives perfect spot and piercing beam. Order now for prompt delivery from your nearby Graybar branch.

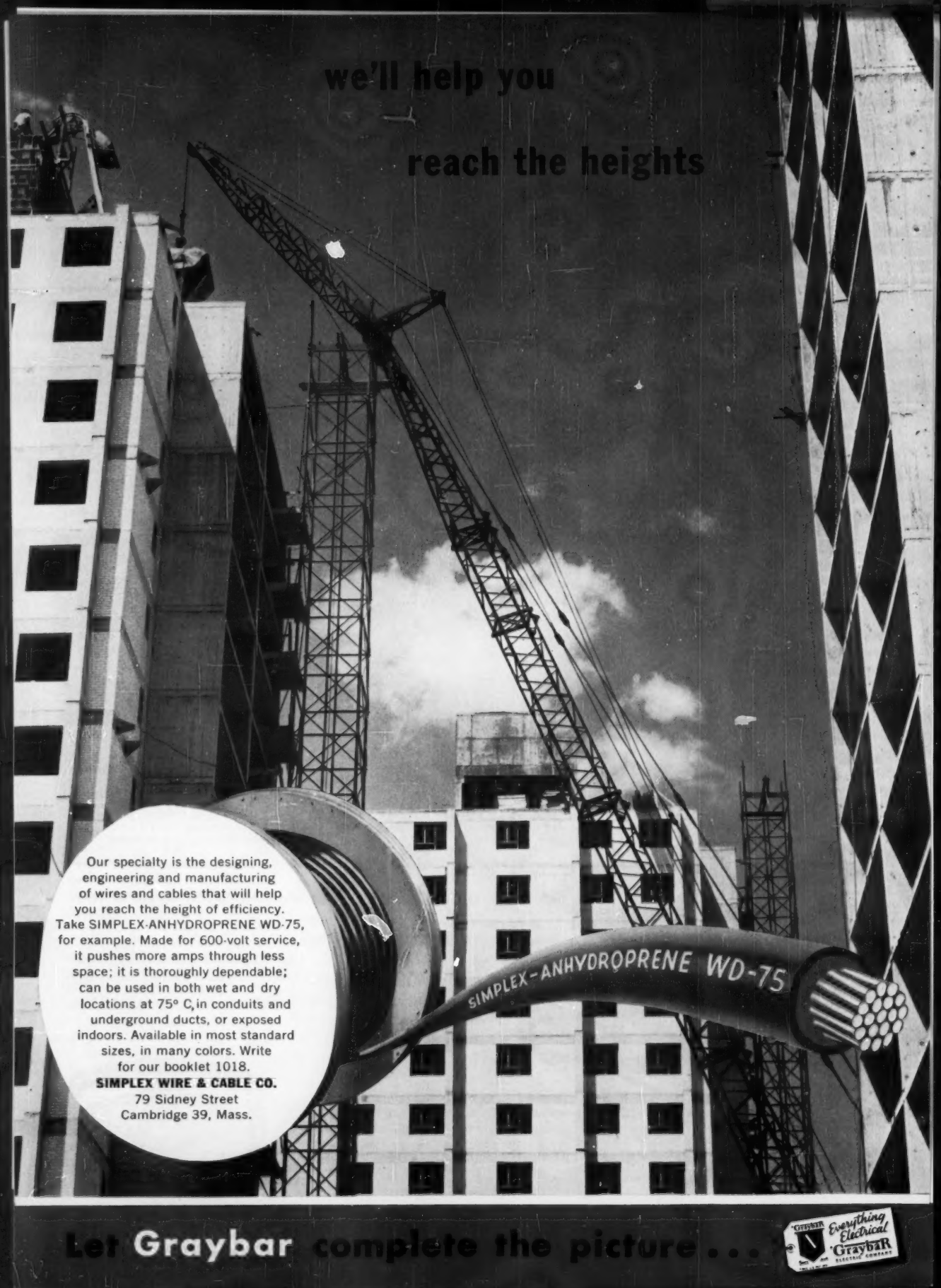
RAY-O-VAC COMPANY
MADISON 10, WISCONSIN

Division Offices: 212 East Washington Ave., Madison 10, Wisconsin. 1388 Madison Avenue, Memphis 4, Tennessee. 461 Market Street, San Francisco 5, California. 1775 Broadway, New York 19, New York. Ray-O-Vac Canada, Ltd., Winnipeg.

PROGRESS THROUGH PRODUCTS THAT SERVE
RAY-O-VAC
1906 1956
50th ANNIVERSARY

Let Graybar complete the picture...

Everything Electrical Graybar



Our specialty is the designing, engineering and manufacturing of wires and cables that will help you reach the height of efficiency. Take SIMPLEX-ANHYDROPRENE WD-75, for example. Made for 600-volt service, it pushes more amps through less space; it is thoroughly dependable; can be used in both wet and dry locations at 75° C, in conduits and underground ducts, or exposed indoors. Available in most standard sizes, in many colors. Write for our booklet 1018.

SIMPLEX WIRE & CABLE CO.
79 Sidney Street
Cambridge 39, Mass.

Let Graybar complete the picture . . .

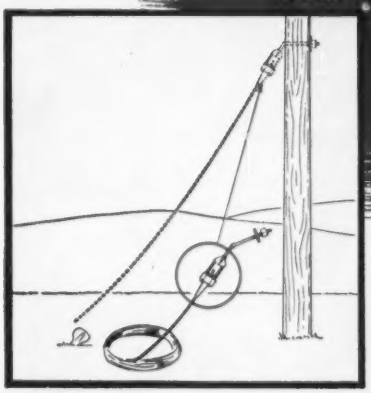
Everything Electrical
GRAYBAR ELECTRIC COMPANY

Complete a down-guy IN 5 MINUTES?

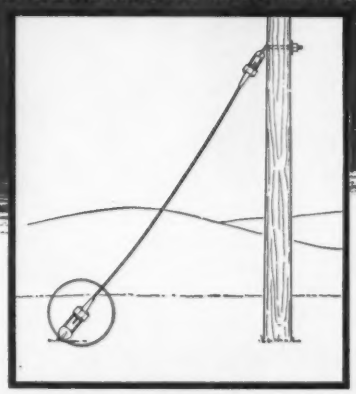
We'll bet your man can do it with . . . STRANDVISE®

Don't take that bet until you've had some of your men try this sure, simple, easy way to install down guys — we'll even bet that you'll be boasting that some of them can do it in less than five minutes.

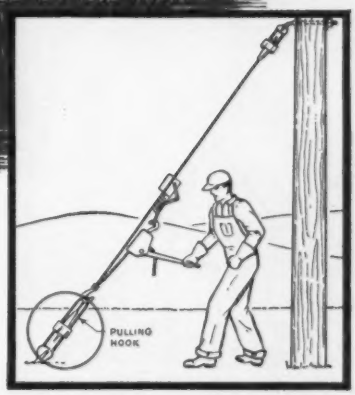
FOLLOW THESE THREE EASY STEPS:
HOIST AND COME-ALONG NEED NEVER BE IN THE WAY



STEP 1 Assemble STRANDVISE to pole-top hardware and complete pole-top installation. Do not cut strand from coil; it is usually wasteful.



STEP 2 Assemble STRANDVISE to anchor eye. Measure strand hand-tight to lower end of STRANDVISE, then cut. Insert strand and feed through STRANDVISE, just hand-tight.



STEP 3 *Now* place come-along and hoist and apply tension. It's just as easy for double or triple guys as it is for singles.

NOW STEP BACK, THE JOB IS DONE . . .
IT'S JUST THAT SIMPLE

And here's a new pulling hook that makes the job even easier, although a pulling hook isn't needed if anchor rod will take a come-along.

Have some of your men try the Reliable STRANDVISE for easy five minute down-guy installations . . . we'll gladly supply samples for the test.

STRANDVISE — available for 3/16" through 7/16" strand, all grades. Stainless steel (rigid) and galvanized steel (flexible) bails for all types of guy attachments.

Reliable POWER LINE CONNECTORS AND CONSTRUCTION SPECIALTIES

ELECTRIC COMPANY
3145 CARROLL AVENUE
CHICAGO 12, ILLINOIS

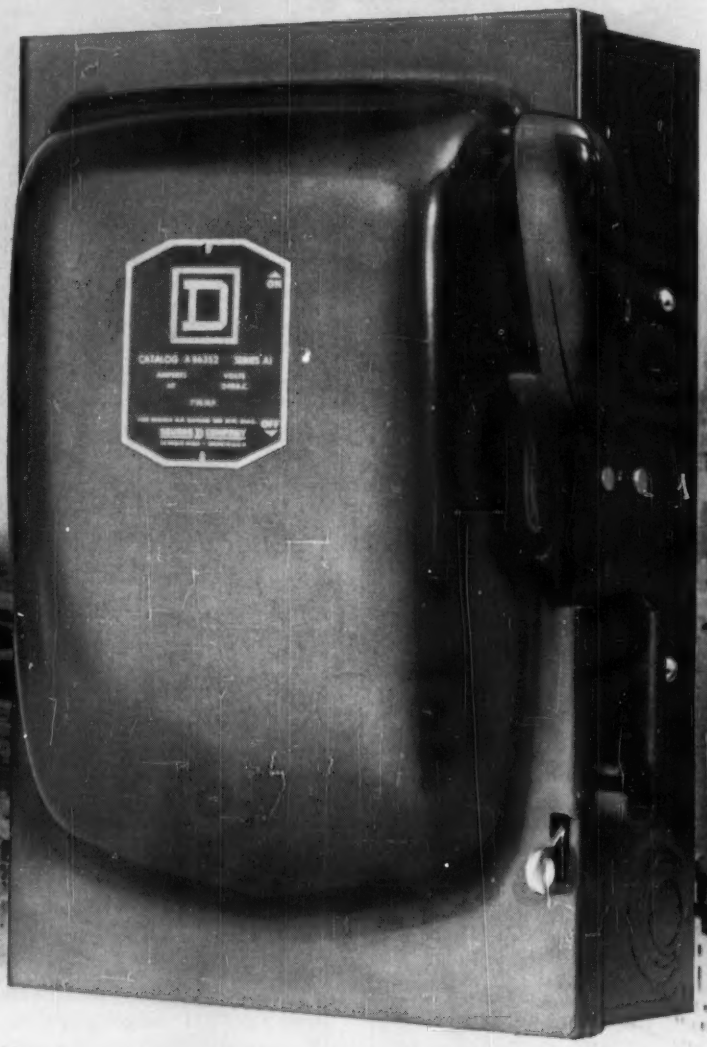
OVER 45 YEARS OF SERVICE TO THE UTILITIES

Let Graybar complete the picture . . .

Graybar Everything Electrical Graybar Electric Company

First Choice for Over 50 years

SQUARE D
SAFETY
SWITCHES



COMPARE...*LINE for LINE* and *FEATURE for FEATURE*

THEY COST NO MORE...WHY SETTLE FOR LESS?

SAFETY SWITCHES and other Square D Products are distributed by GRAYBAR

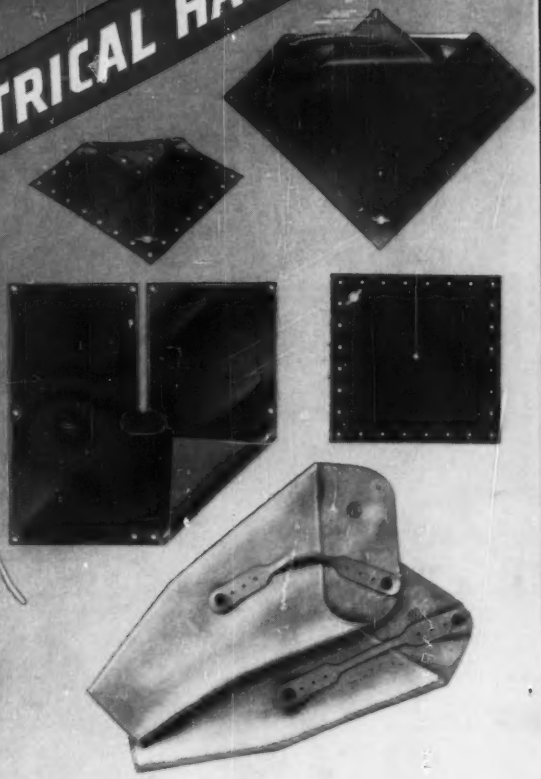
SQUARE D COMPANY

Let Graybar complete the picture....

Everything Electrical Graybar Electric Company

For Safety's Sake

A DEVICE FOR EVERY ELECTRICAL HAZARD



MANUFACTURERS SALISBURY CHICAGO RUBBER PRODUCTS ESTB. 1855

SALISBURY

RUBBER PROTECTIVE DEVICES

for Linemen

. . . Approved by safety engineers from coast to coast . . . Adopted for safety by public utility companies everywhere . . . Designed for maximum dependability and convenience in use . . . Made from highest grade materials by the pioneers in manufacture of rubber protective equipment for linemen . . . Send for our Utility Catalog.

W. H. SALISBURY & CO.

GENERAL OFFICE AND FACTORY

MORGAN & KINZIE STS. CHICAGO 22, ILLINOIS

Let Graybar complete the picture . . .

Everything Electrical Graybar Electric Company

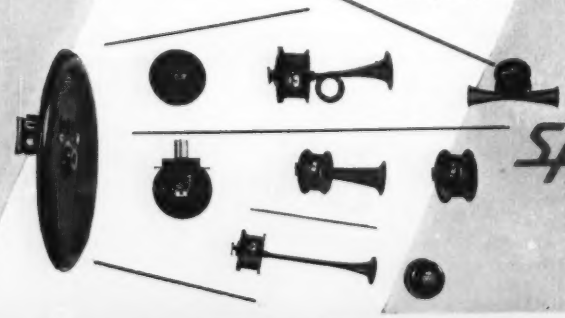
AUDIBLE SIGNALS THAT ARE EASIER TO INSTALL AND INTERCHANGE

Follow these Simple Steps for Safer, Faster, Easier, Installation

1. Wire to back of dead front adapter plate

2. Secure adapter plate to box or fitting

3. Plug any of 12 Uni-pact signals Into adapter plate



12 interchangeable sound instruments assure correct sound level for every situation. When changed noise levels demand a new type of signal, there is an interchangeable bell, buzzer, horn or chime to fit your requirements—and they're as easy to install as plugging in any appliance.

Electrically dead front adapter plate and elimination of exposed terminals assure safety.

Sperti Faraday Inc.

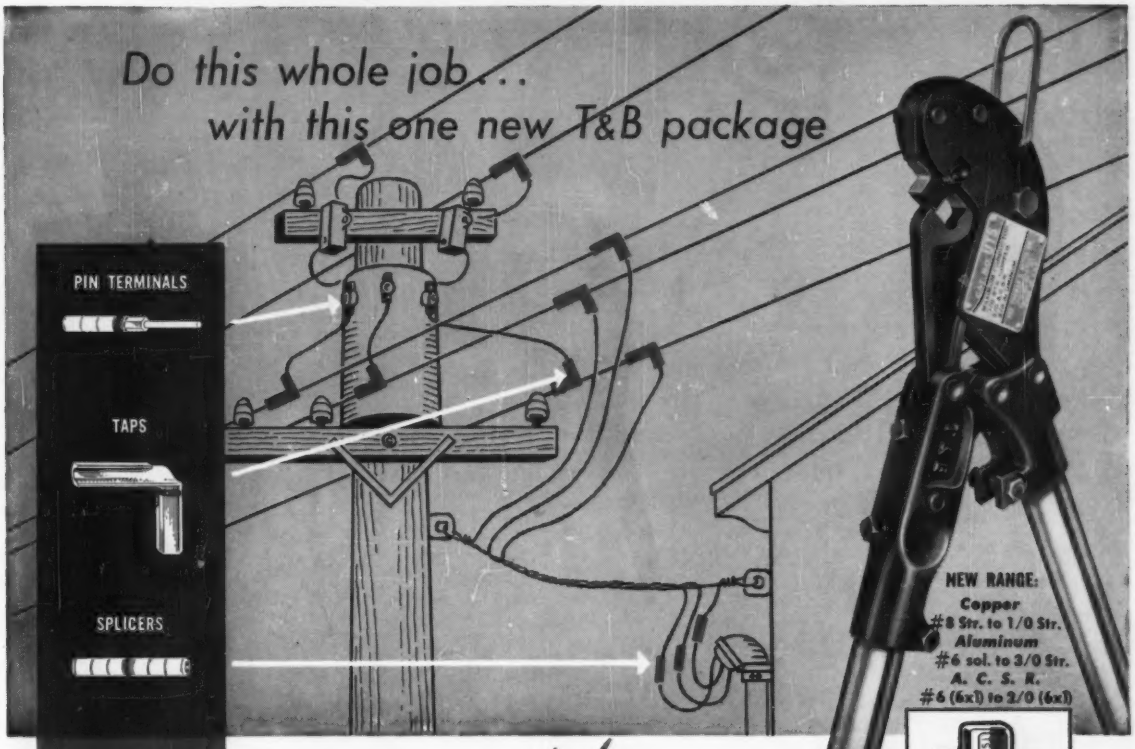
Engineers in sound and sight since 1875

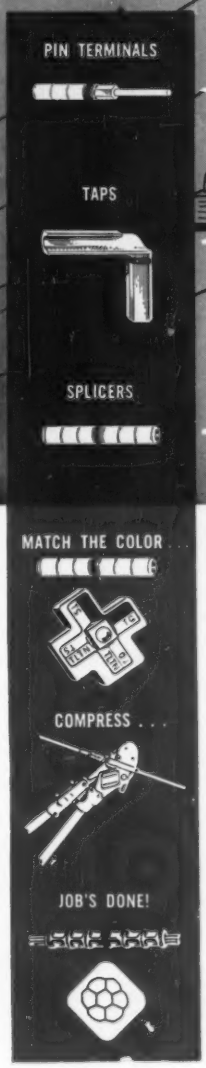
ADRIAN, MICH.

Sperti Faraday of Canada, Ltd., Montreal, Quebec

Let Graybar complete the picture . . .

Everything Electrical
GraybaR





NEW!

T&B complete COLOR CODED splicing package speeds line and service work

Now one new UT 5 installing tool is the *only* tool you need to make all line and service compression connections . . . including splicers, taps, and pin terminals. And T & B's color-coding insures accurate, speedy connections on a wide range of copper, aluminum and A. C. S. R. cable.
Here's all you do . . . match the color of the die to the color of the connector . . . compress . . . and the joint is made.

Your T & B Distributor will be glad to demonstrate the UT 5 with its many advantages. When you use this one tool you simplify all your line and service work.
For further information write for new T & B bulletin.

LOOK FOR THIS SIGN — T&B ENGINEERED

IT'S THE MARK OF AN AUTHORIZED T & B DISTRIBUTOR

The complete line of T & B fittings for conductors and raceways is sold only by recognized electrical wholesalers. It's our way of assuring you the service and savings of a friendly local source. Call him for all your electrical needs. T-61

THE THOMAS & BETTS CO.

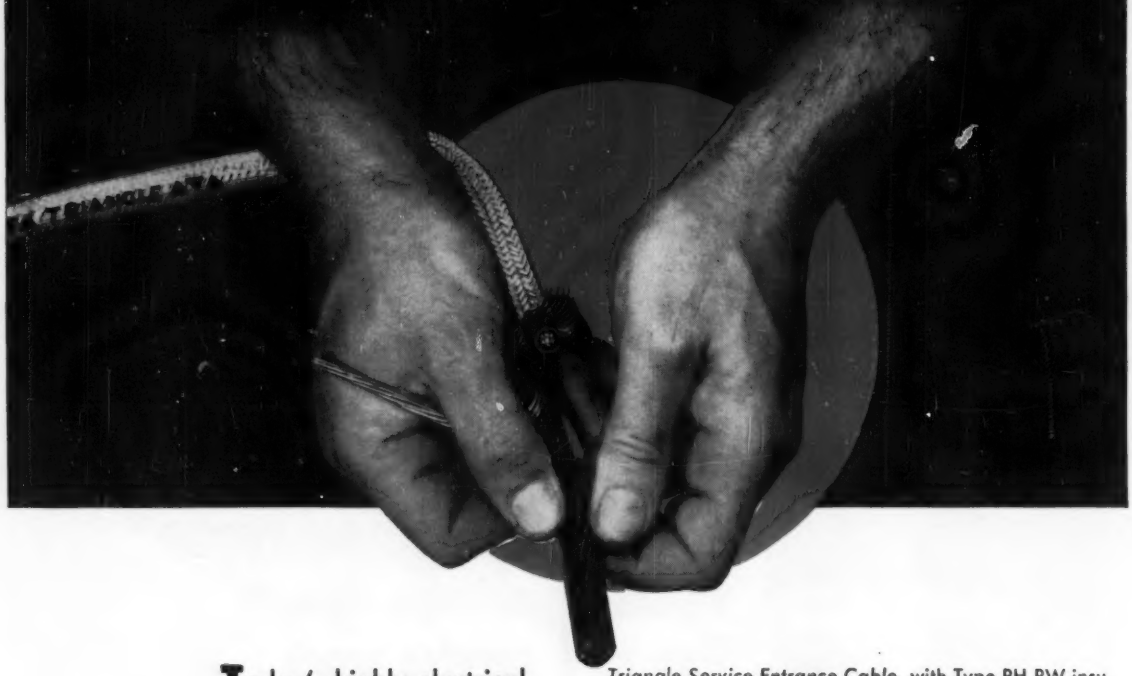
INCORPORATED

14 Butler Street • Elizabeth 1, New Jersey
Thomas & Betts Ltd., Montreal, P.Q., Canada
MANUFACTURERS OF FINE ELECTRICAL FITTINGS SINCE 1898

Let Graybar complete the picture . . .

Graybar Everything Electrical Graybar Electric Company

This IS THE SERVICE ENTRANCE CABLE FOR TODAY'S HIGHER LOADS WITH TRIANGLE RH-RW INSULATION



Today's highly electrical homes demand a Service Entrance Cable with the ability to handle much heavier loads than ever before. That's why Triangle changed to a better insulation—Type RH-RW. All Triangle Service Entrance Cable is now furnished with this fine insulation. Type RH-RW insulation exceeds Underwriters' specifications for either RH or RW.

Triangle Service Entrance Cable, with Type RH-RW insulation, is far and away your best buy. Not only does Triangle Service Entrance Cable incorporate today's highest quality insulation, the cable also has these outstanding advantages:

1. "Silver" outer cover.

Clean, smooth, good-looking, takes and holds paint, easy to strip.

2. Tough and weatherproof—yet flexible.

The cover and inner construction of Triangle Service Entrance Cable are made for *long-lasting* ruggedness and flexibility. The outer braid is a unique combination of glass filaments and long-staple cotton for long life and a guarantee against peeling, cracking or festooning. Inner layers are made from the best available material—so good, that you can "feel" the quality of this cable the minute you handle it.

It Must Be Right
The Trade Mark of TOP Quality
TRIANGLE ®

TRIANGLE CONDUIT & CABLE CO., INC.

NEW BRUNSWICK, N. J.

Manufacturers of Arteries for Electricity, Liquids and Gases

WIRE • CABLE • CONDUIT • PLASTIC PIPE • BRASS AND COPPER TUBE

Let Graybar complete the picture . . . .

Everything Electrical Graybar Electric Company

Speed up production and cut costs!

THOR ELECTRIC SCREWDRIVERS

THOR ED-SERIES SCREWDRIVER IN ACTION

This 3 lb. heavyweight Thor screwdriver doubles as a nut setter—ranges in weight up to 4⅛ lbs. Drives screws up to No. 12. Sets nuts up to ¼" thread.

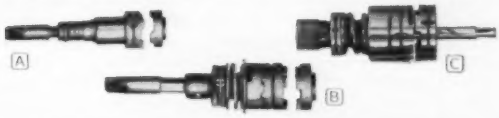
Thor PORTABLE POWER TOOLS

STAMINA, power and versatility all describe Thor universal electric screwdrivers. Powered by precision Thor-built motors, these tools have plenty of reserve punch to set screws and nuts in hard material—fast. A wide variety of angle and nut setter attachments are available. There's a choice of handles, switches and clutches and Thor offers balancers for tool suspension. Ask your nearest Thor distributor for a demonstration. Thor Power Tool Company.

HEAVY DUTY THOR F-SERIES PACKS EXTRA POWER FOR BIGGER JOBS

F-series drives up to No. 14 screws, sets up to ⅞" thread. (Shown with lever handle; pistol grip models also available.)

Your choice of 3 Thor clutches



A **POSITIVE CLUTCH ATTACHMENT.** Screwdriver bit turns when operator applies pressure to work, stops when pressure is relieved.

B **DOUBLE SLIP CLUTCH ATTACHMENT.** Clutch can be set to any pre-determined tension. Insures uniform tightening. Screwdriver bit slips when desired tension is reached.

C **KICK-OUT CLUTCH ATTACHMENT.** Same principle as double slip clutch except that clutch does not "slip" when desired tension is reached, but automatically "kicks-out." Recommended for heavy-duty machines.

THOR POWER TOOL CO., Aurora, Ill.

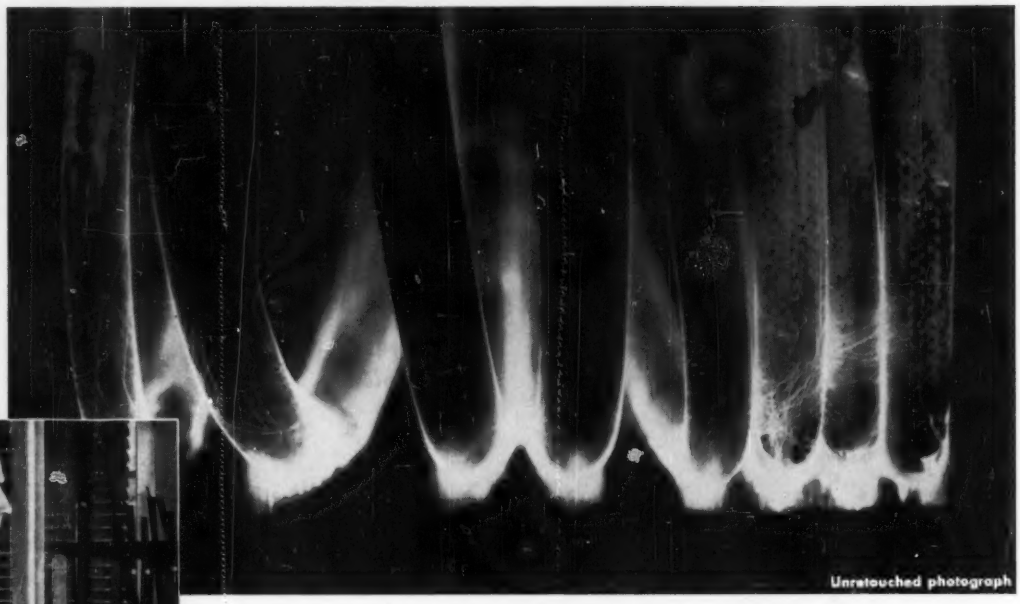
Branches in all principal cities

Let Graybar complete the picture . . .

Graybar Everything Electrical Graybar Electric Company

US RUBBER

GRIZZLY® POWER CABLES



Unretouched photograph

Under High Ozone Attack resulting from excessive voltage outlast 9 other leading brands tested!

In United States Rubber Company's special wire and cable testing laboratory, scientific devices record how cables react under abnormally high voltage.

In this test, 6 samples of 5 KV unshielded U. S. Grizzly Power Cables were pitted against 26 other 5 KV samples made by 9 leading competitors. Lengths were bent into U-shapes, roughly 8 times the cable's over-all diameter. They were then placed upright on a grounded metal plate with bottom of "U" resting on plate. Then a conductor-to-plate potential of 40,000 volts was applied. The test was allowed to run until all cables failed, with elapsed time to failure carefully checked for each. The accompanying chart shows dramatically the overwhelming superiority of U. S. Grizzly Power Cable.

U. S. Grizzly Power Cables are obtainable at your "U.S." branch, distributor, or write us at Rockefeller Center, New York 20, N. Y.

Manufacturer	No. of samples tested	Elapsed time to failure—in hrs. Lowest value	Highest value
"U.S."	6	2941	6030
A	2	0	3
B	5	0	92
C	2	0	.6
D	3	12.5	144
E	3	300	490
F	2	30	46
G	6	.1	2509
H	2	0	0
I	1	25	25

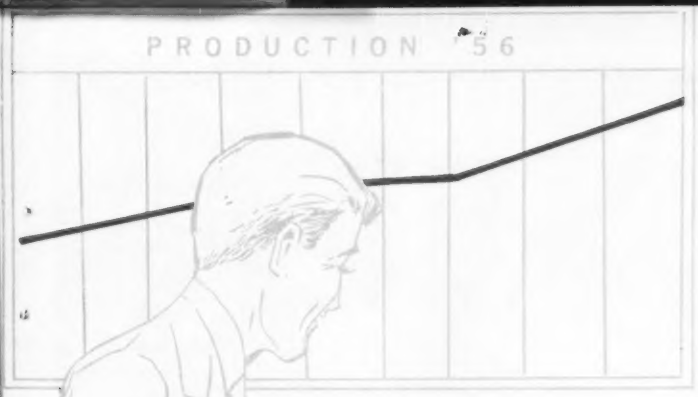
US RUBBER

Electrical Wire & Cable Department

United States Rubber

Let Graybar complete the picture . . .

Graybar Everything Electrical Graybar Electric Company



PUTTING PRODUCTION IN THE "HIGHER EFFICIENCY BRACKETS"

outstanding new industrial lighting fixture — 28% uplight! Desirable low cost!

Unique Wheeler construction! Approximately 28% of the total fixture illumination is UPWARD and 72% is downward, thus providing greater seeing comfort, better brightness ratios and higher quality illumination.

30° cross-wise shielding of both lamps reduces direct glare to a minimum. Write for Bulletin No. 97.

BI-FLO UPLITER

WHEELER RLM

There's a Wheeler Incandescent or Fluorescent Lighting Fixture to meet every industrial requirement.

Wheeler Reflector Company

275 Congress Street - Boston, Mass.

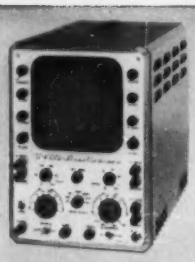
Distributed Exclusively through Electrical Wholesalers

Certified Lighting for a Better America

75th Anniversary 1881-1956

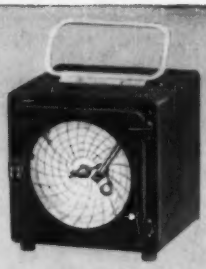
Let Graybar complete the picture . . .

Everything Electrical Graybar Electric Company



Weston OSCILLOSCOPE (Model 983)
— a high gain, wide band scope with identical amplifiers, ideal for phase measurements, frequency comparisons, and *all-purpose* visual wave form analysis. Choice of a-c or d-c coupling —excellent square wave reproduction, overshoot 2 to 5% — rise time 0.1 microsecond. Sensitivity (both amplifiers) 15 millivolts per inch RMS — band pass characteristics within 3 db at 4.5 megacycles.

Weston TUBECHECKER (Model 981)
— standard throughout industry since 1926. Filtered d-c potentials provide better Gm accuracy. Voltage divider network for better grid bias settings. The four signal levels provided protect against excessive grid current surges. Provision for tube interelectrode leakage measurements as high as 10 megohms.



Weston Miniature ELECTRICAL RECORDER (Model 6401)
— ideal for recording current variations — monitoring radio detectors — recording speeds—making life tests on batteries, lamps, etc. Employs Cormag® self-shielded mechanism—size only 6¾" x 6¼" x 7"—chart size 4" dia. Available in required ranges for a-c or d-c voltage or current measurements.

Specialized Instruments..

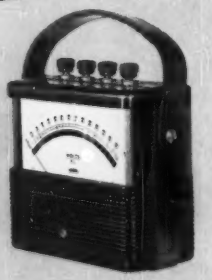
— to do important electronic and electrical measurement jobs *better, quicker, at lower cost*

Literature on these and other Weston instruments for production, laboratory or maintenance needs, gladly sent on request.

WESTON *Instruments*

WESTON ELECTRICAL INSTRUMENT CORPORATION
614 Frelinghuysen Avenue, Newark 5, New Jersey

Weston 1301 Line Panel Instruments
— a new line of 3½" panel instruments employing the CORMAG® self-shielded mechanism, which provides added dependability and substantial cost-savings on built-in requirements. Instruments can be mounted on magnetic or non-magnetic panels interchangeably, and there is no magnetic intereffect when mounted in close proximity.



Weston Precision Portables (Model 901)
— provide unequalled scale visibility due to wrap-around windows, efficient shielding, accuracy of 0.5%. Available as d-c voltmeters, volt-ammeters, ammeters and milliammeters — a-c single and 8 range voltmeters, single and 7 range ammeters, milliammeters—also a-c and d-c single phase wattmeters.

Weston All-Purpose ANALYZER (Model 980)
— a versatile, rugged instrument with a combination of functional ranges to cover a wide range of test measurement needs. D-c sensitivity 20,000 ohms/volt, a-c sensitivity 1000 ohms/volt. Range and functional switching greatly simplified by use of a single dial. Accuracy 2% d-c; 3% a-c. Scale length 4.63" — size 6¼" x 7½" x 3¼".

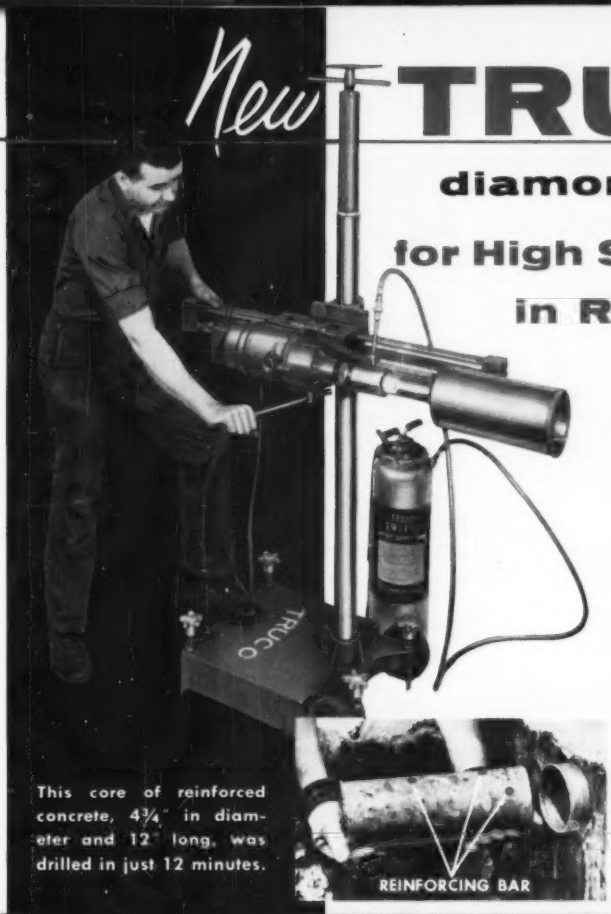
Weston Miniature CLAMP VOLT-AMMETER (Model 749)
— light weight, pocket size, and really rugged. Employs CORMAG® self-shielded, shock-mounted mechanism. Shatter-proof Plexiglas window. One scale for all ranges and functions. Jaws take up to 1" round or 1¾" rectangular conductors. Ranges—current: 300/150/60/30/15/6 amperes a-c...voltage: 600/300/150 volts a-c.

Let Graybar complete the picture...

Offer Everything Electrical Graybar Electric Company

New TRUCO portable diamond drilling machine

for High Speed Drilling anywhere in REINFORCED CONCRETE with bits up to 14" O.D.



This core of reinforced concrete, 4¾" in diameter and 12" long, was drilled in just 12 minutes.

The new Truco Diamond Drilling Machine takes Truco diamond drill bits all the way up to a huge 14" O.D. bit (ideal in drilling for air conditioning ducts) as standard equipment. Three drill motors available for varying drilling conditions. Truco's exclusive 360° sweep, both vertically and horizontally, and vertical adjustment for wall drilling, make it very versatile. Completely portable and easily operated by one man. Fast, clean cutting (freedom from noise and dust) and fine accuracy of the Truco unit (as compared to ordinary drilling techniques) can easily offset the entire investment in drill machine and diamond bits on its first job.

TRUCO swivel diamond bits

Every Truco Swivel Diamond Bit is set with the correct size and quantity of very fine industrial diamonds to assure clean, positive, fast cutting action. Air conditioning, building maintenance and utilities personnel, as well as the electrical trades, have all found the "Truco Combination" an indispensable tool . . . a tool that can easily save its purchase price on the first drilling project.

Medium or Heavy Duty Swivel for large bits
Expansion Adapter for use with bits 1" and larger
Swivel Shaft Extension Rod permits drilling to greater depth with standard length bits
Standard Duty Swivel for small bits
Water Valve
Ten feet of rubber hose with connections
½" O.D. Drill Bit

WHEEL TRUEING TOOL COMPANY

91-3200 W. Davison Ave. • Detroit 38, Michigan

Established 1910

Let Graybar complete the picture . . .

Everything Electrical Graybar Electric Company

. . . there's a Graybar office or warehouse *near* you!

Local stocks of standard utility needs and fast delivery of non-stock lines assure on-schedule deliveries when you order 100% via Graybar. There's a minimum of paper work involved and there's no problem in co-ordinating deliveries from numerous widely separated suppliers. And you can be sure Graybar thoroughly understands your needs – routine and emergency – for we've been serving the utility industry ever since the first lines went up. Check the list below for the Graybar office or warehouse nearest you, then make it a point to call Graybar First!

ALABAMA
Birmingham
Mobile

ARIZONA
Phoenix
†Tucson

ARKANSAS
Little Rock

CALIFORNIA
Fresno
Long Beach
Los Angeles
Oakland
Sacramento
San Bernardino
San Diego
San Francisco
†Santa Ana

COLORADO
Denver

CONNECTICUT
New Haven
West Hartford

DELAWARE
Wilmington

DIST. OF COLUMBIA
Washington

FLORIDA
†Fort Lauderdale
Jacksonville
Miami
Orlando
†St. Petersburg
Tampa

GEORGIA
Atlanta
Savannah

IDAHO
Boise

ILLINOIS
Chicago
Peoria
Springfield

INDIANA
Evansville
Hammond
Indianapolis

IOWA
Davenport
Des Moines
Sioux City

KANSAS
Wichita

KENTUCKY
†Lexington
Louisville

LOUISIANA
Baton Rouge
Lake Charles
New Orleans
Shreveport

MAINE
Portland

MARYLAND
Baltimore

MASSACHUSETTS
Boston
Springfield
Worcester

MICHIGAN
Detroit
Flint
Grand Rapids
Lansing

MINNESOTA
Duluth
Minneapolis
St. Paul

MISSISSIPPI
Jackson

MISSOURI
Kansas City
Springfield
St. Louis

MONTANA
Butte

NEBRASKA
Omaha

NEW HAMPSHIRE
Manchester

NEW JERSEY
†Clifton
Newark
New Brunswick

NEW YORK
Albany
*Binghamton
Buffalo
Garden City
New York City
Rochester
Syracuse

NORTH CAROLINA
Asheville
Charlotte
Durham
Rocky Mount
Winston-Salem

OHIO
Akron
Cincinnati
Cleveland
Columbus
Dayton
Portsmouth
Toledo
Youngstown

OKLAHOMA
Oklahoma City
Tulsa

OREGON
Eugene
Portland

PENNSYLVANIA
Allentown
*Erie
Harrisburg
Philadelphia
Pittsburgh
Reading

RHODE ISLAND
Providence

SOUTH CAROLINA
Columbia
Greenville

SOUTH DAKOTA
Sioux Falls

TENNESSEE
Bristol
Chattanooga
Knoxville
Memphis
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TEXAS
Abilene
Amarillo
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Dallas
El Paso
Fort Worth
Houston
*Lubbock
San Antonio

UTAH
Salt Lake City

VIRGINIA
Norfolk
Richmond
Roanoke

WASHINGTON
Seattle
Spokane
Tacoma

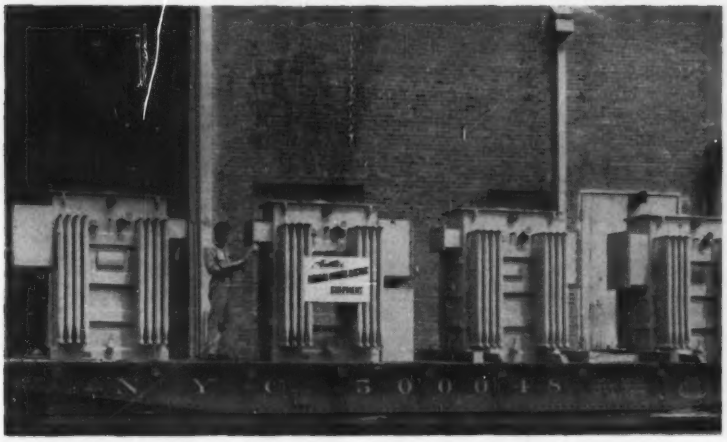
WISCONSIN
Green Bay
Madison
Milwaukee

**Sales Office*
†Sub-branch

CALL GraybaR FIRST FOR *Everything Electrical* GraybaR ELECTRIC COMPANY

IN OVER 130 PRINCIPAL CITIES

GRAYBAR ELECTRIC COMPANY, INC., 420 LEXINGTON AVENUE, NEW YORK 17, N. Y.



First Transformers Shipped

. . . by Federal Pacific for third tube of Lincoln Tunnel

Four of 45 distribution transformers are on their way to the third tube of the Lincoln Tunnel between New York and New Jersey. Shipment was made from the Gardner Transformer Division of Federal Pacific Electric Co at Emeryville, Calif.

"They are a part of a Federal Pacific Electric order," said Richard F. Gibbons, general manager of the Gardner Division, "for nearly $500,000 worth of low and high-voltage switchgear, motor control centers, bus duct, and distribution transformers."

These first four, far-traveling transformers are rated 1,000 kva, 3-phase. They will be used in conjunction with the large exhaust fans required to ventilate the 8,000-ft tube near its portals.

Magnetic Couplings Slated for Boiler Feed Pumps

Magnetic slip couplings will be used to provide adjustable speed for high-pressure boiler feed pumps at the new Silas G. McMeekin Station of South Carolina Electric & Gas Co. This type of coupling will be installed on pumps operating above 3,600 rpm.

For generating unit No. 1, three 2,500-hp, 1,800-rpm magnetic drives have been ordered from Electric Machinery Mfg Co, Minneapolis. They will drive 5,000-rpm, 2,793 psi pumps through 1:3.045 step-up gears.

In addition, two adjustable magnetic drives for induced draft fans and two for forced draft fans for unit No. 1 will be built by Electric Mchy.

Advantages for the pump application, as outlined by the manufacturer, are: **1.** Pump operating at high speed develops more head per stage, and therefore is small; **2.** driving motor is 1,800 rpm which is less costly than 3,600 rpm motor of comparable rating; **3.** accurate control of output is obtained by adjustable speed, providing plus or minus 0.5% speed control; **4.** lower speeds for decreased pump output saves wear on the impellor; and **5.** power for driving motor is conserved because at part speed the pump requires less torque.

IPCEA Broadens Scope; Adds Two New Sections

Insulated Power Cable Engineers Association is broadening its field of activities with the addition of two sections, according to Secretary G. M. Haskell, 283 Valley Road, Montclair, N. J. They are:

1. Communication Cable . . . Scope of this section includes design, construction, testing and application of insulated cables used in fields of communication such as:

Dispatch and patrol, fire alarm, inter-communication, police signal, supervisory control, telemetering and telephone.

2. Bare and Covered Overhead Conductors . . . This section is concerned with the design, construction and application of conductors used in transmission and distribution. Its scope:

Sag-tension charts, conductor application data, current carrying capacities, conductor design, code names and reels.

U. S. Copper Production

Primary copper production was 96,880 tons in May, the Copper Institute reports. This is 1,380 tons over April production. Refined May production was 142,445 tons, up from 140,032 tons in April. May deliveries to fabricators was 140,727 tons, up from April's 139,927 tons. Refined stocks at the end of May amounted to 53,443 tons, down 1,444 tons over April.

MIMA Extends Work on Thermal Insulations

Technical and informational activities of the Magnesia Insulation Manufacturers Association, New York, have been expanded to cover two additional types of thermal insulation for high temperature service, calcium silicate and expanded silica. One or the other of these insulations is produced currently by all member companies.

Association interests now embrace the two newer products as well as 85% magnesia and diatomaceous silica insulations. Eighty-five percent magnesia is recommended for hot piping and equipment with temperatures up to 600 F and in combination with diatomaceous silica up to 1,900 F. Calcium silicate insulations are for use up to 1,200 F and the expanded silica insulation to 1,600 F.

(*More M&M on page* 249)

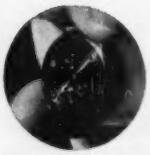
Ask these questions, too, when you judge a fluorescent lamp...

Is it made with Halo Phosphor?

No other phosphors in use today can match Halo Phosphors for maintaining high light output and original color. Westinghouse (and only Westinghouse) uses Halo Phosphors throughout its entire fluorescent lamp line.

Are its electrodes built for longest lamp-life?

Constant development of new and better ways to make fluorescent lamp electrodes has enabled Westinghouse to *triple* the life of its fluorescent lamps since 1948.



Is it easy to seat securely?

Westinghouse fluorescent lamps are built with "guide bumps" on the end-caps. Easily felt with the fingers during lamp installation, they tell at a touch when the lamp has been securely seated in its sockets.

For the full story on how to get more for your money in fluorescent light, contact your Westinghouse Lamp representative. You can be sure . . . if it's Westinghouse.

WATCH WESTINGHOUSE

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU***

Expansions Reported by Manufacturers

• A 150,000-ton smelting plant and a 375-Mw steam power plant, fired by coal, will be constructed by Aluminum Co of America. The plants will be located near Evansville, Ind. Cost of the project will be about $80 million. First production is scheduled for late 1957. Integrated operation of the smelter on its own power is expected by mid-1958. Peabody Coal Co has contracted for the mining and supplying of coal to the electric plant to be operated by the Southern Indiana Gas & Electric Co for Alcoa.

• Consolidation of inventory will be possible for Chase Brass & Copper Co at its new quarters at 4641 McRee Ave, St. Louis, Mo. Here is located a 40,000-sq-ft warehouse and 7,500-sq-ft office. Relocation was forced because of a state throughway extension. Louis J. Vogler continues as district manager.

• A $113 million expansion of Kaiser Steel Corp's Fontana, Calif., steel mill will begin at once, Jack L. Ashby, vice president announced. Completion is scheduled for 1958. Company's production of finished steel products is to be increased from 1,084,000 tons to 1,528,000 tons per year. Iron ore deposits are located about 164 miles from the steel mill.

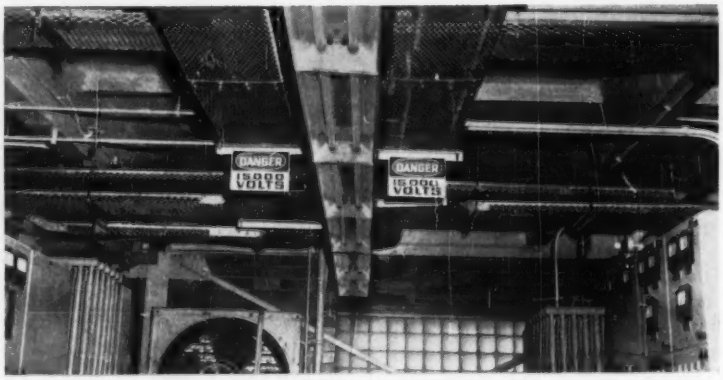
• A new office is being constructed for Sangamo Electric Co, Springfield, Ill. It will be a three-story building of brick construction, 75-ft wide by 114-ft long by 42-ft high. Estimated cost is $480,000, or about $1.35 per cu ft. This new building will adjoin the Engineering Laboratory. Parking facilities lost by construction of the new office will be available at another area close to the present building site.

• To increase production of wire, cable and cord sets for appliances, radio, television and electronics, Victor Electric Wire & Cable Corp, Clifton, N. J., will add about 200,000 sq ft of floor area. The company had acquired the former Harris Mill of the Interlaken Mills, Coventry, R. I. Here full production is expected in about six months.

• Manufacture of wiring devices is to be increased by a 60,000-sq-ft addition to existing facilities of Henry Hubbell, Inc., Bridgeport, Conn. This addition will bring total manufacturing office and warehouse area to more than 300,000 sq ft. Estimated cost of this unit and a single story raw stock storage building first completed will be about $1 million.

• An electrical equipment assembly plant to be started before August in Atlanta, Ga., will be base of Square

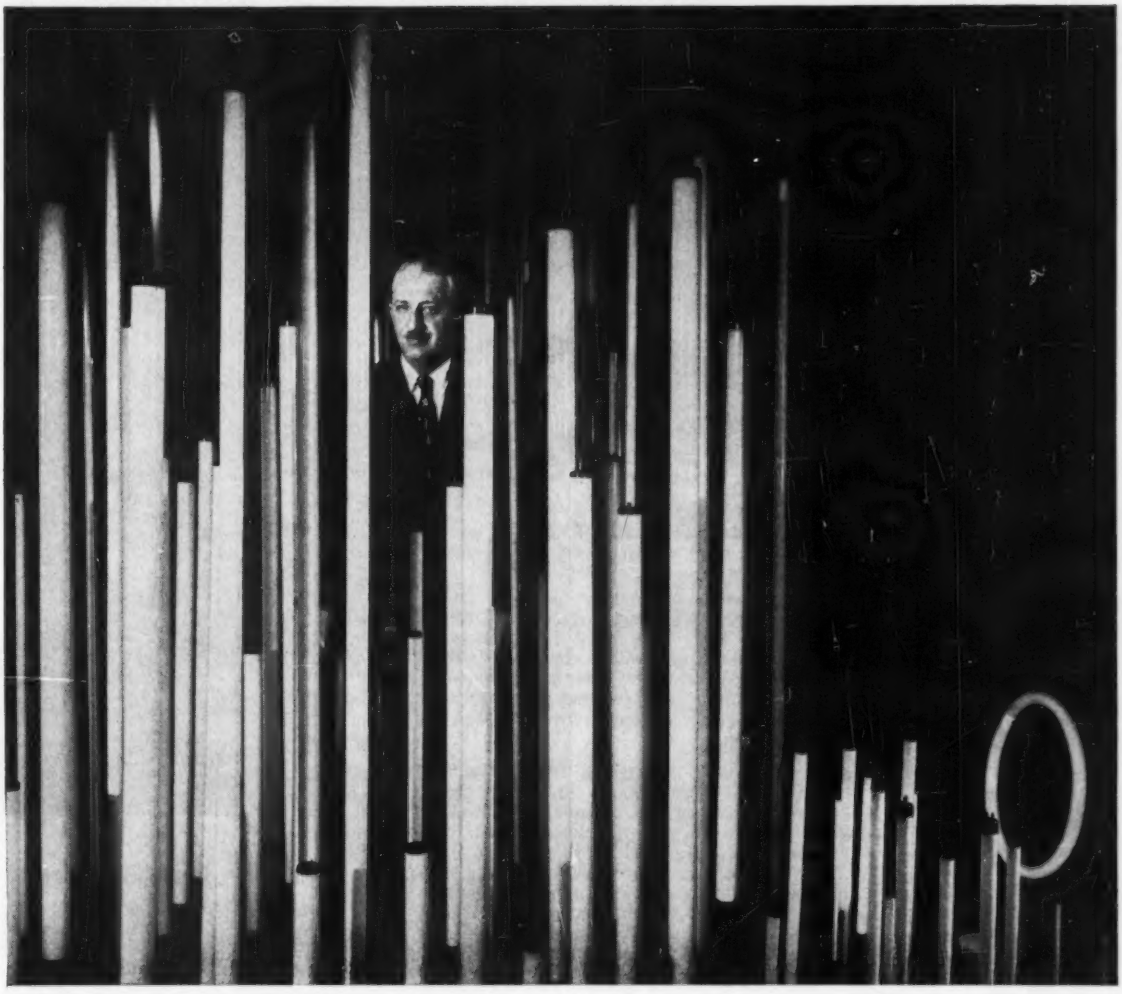
(*Continued on page* 250)



Expanding Paper Firm Uses Cable Trough

Scott Paper Co engineers, faced with future plant expansions that include additional units in the substation pictured above, used metal trough to support power and control cables. Located in Everett, Wash., the paper firm claims the metal trough system reduced design problems, permitted quick, economical installation, and saved space. T. J. Cope, Inc, of Collegeville, Pa., supplied the cable trough.

how to judge a fluorescent lamp . . . point no. 4



ask about **FULL SELECTION**

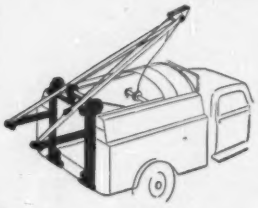
Smartest move you can make when you buy fluorescent lamps is to see to it that you get precisely the right type, size and color for the lighting job to be done. In the Westinghouse fluorescent family of 290 different lamps—including Slimline and Rapid Start—there's a type and size precisely right for every office, plant and merchandising application. And the full Westinghouse color range includes seven different shades of "white" alone.
You can be sure . . . if it's Westinghouse.

WATCH WESTINGHOUSE
*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU***

Fold Up Your Derrick from Inside The Cab!

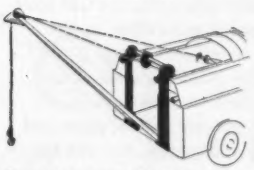
U. S. Patent No. 2.336.965

with the *Tel-E-Lect* STORAGE KIT



Derrick raised by simply engaging the winch.

Vertical position—winch rotation reversed.



Derrick is locked in operating position.

★ Saves Space
★ Saves Time
★ Saves Money

You know what a tough job it is to assemble an "A" frame derrick—and to put it away after use. Now Tel-E-Lect has a simple solution with a real dollar saving in time on the job—a saving of space on your trucks—and a saving in many hours of back-breaking and hazardous work for your men.

The patented Storage Kit fits any standard utility truck body and "A" frame derrick and it can be quickly bolted on the back of your truck by your local mechanic. The derrick will go up or down in a minute or less, entirely controlled by the man in the truck cab. Working with a double drum winch, you get live boom operation—or easily adjustable derrick elevation with a single drum winch.

The cost is only a fraction of other, more intricate derrick storing systems—and there's no rebuilding of your present equipment!

So, while you're thinking about it, drop a line to Tel-E-Lect for diagram and price. It's sensational!

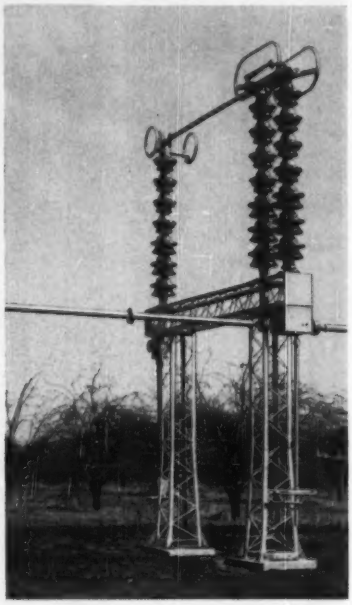
Earth Boring Equipment for All Types of Trucks

Tel-E-Lect **PRODUCTS, INC.**

10,003 Minnetonka Blvd.
Minneapolis 26, Minn.

(*Continued from page* 249)

D Co's expanded operations in the Southeast. The $500,000 building will house the Atlanta regional headquarters and provide production facilities. Field engineering offices in Georgia, Florida, Alabama and other states are expected to be increased in later expansions. Square D manufactures electrical distribution and control devices.



Canadian Firm Supplies All-Aluminum Switches

Eastern Power Devices, Ltd, has announced it will supply 345-kv outdoor disconnecting switches using all-aluminum current-carrying parts for British Columbia Electric Co early next year. They are similar to a 230-kv type (see photo), more than 100 of which were supplied Quebec Hydro for the St. Lawrence project.

The Toronto manufacturer began experiments on high-voltage switches in 1948 when an outdoor type, with aluminum castings and blade, was installed for the 287-kv switching station at Kitimat, B. C. Since 1953, a 15-kv switch with aluminum on the jaw and hinge end, and an aluminum blade and moving contact has undergone study at Toronto with favorable results, the company reported.

ENGINEERING MEMO FROM KAISER K/W WIRE

2.1

TRIPLEX SAG DATA

BY NEIL BARR

CHIEF ENGINEER,

ELECTRICAL CONDUCTOR DIVISION

THE TABLES shown here contain sag and tension data for triplex cable. Each table is for one particular loading district—Heavy, Medium, and Light—and contains information for both Polyethylene and Neoprene insulated power conductors.

We have established three governing conditions for the sag data as listed on each page. These conditions are as follows:

50% under indicated loading conditions.

33⅓% under initial no-load conditions at the temperature of loaded conductor.

25% under final no-load conditions at same temperature.

The sags indicated on these pages are such that these limitations will not be exceeded.

In the past, a question has arisen "Must the cable be installed with such a high tension?" Obviously, the answer should be no. The sags listed are minimum required (maximum allowable tension), so that under load the tension will not exceed the specified limit of 50%. One may install the conductor with any desirable amount of sag greater than listed, so long as necessary ground clearance is maintained.

You will note that only one set of data is listed for each size power conductor. An example of this would be a #4 neutral with either a #4 solid, or #4-7 strand power conductor. The sag for the two would be so close that only one construction is listed. Either could be installed using this data and no significant error would result.

Both initial and final data are listed, the initial being used for installing the conductor, and the final for figuring ground clearance.

Data is prepared for a 125 foot span. We have chosen this as a representative span from requests submitted to us. If data is required for spans other than this, the sag may be read for the 125 foot span at the temperature desired and this value multiplied by the square of the span ratio. Thus, sags for other span lengths may be based on a 125 foot ruling span.

During the electric industry's rapid expansion, Kaiser Aluminum has concentrated intensively on utility problems—with special emphasis on covered wire.

Today, Kaiser Aluminum is the nation's fastest growing producer of aluminum wire and cable, making available the latest helpful information on modern products and practices.

A Kaiser Aluminum representative or a K/W distributor will be glad to give you immediate attention. Call your Kaiser Aluminum sales office. Kaiser Aluminum & Chemical Sales, Inc., *Executive Office*, Kaiser Bldg., Oakland 12, California; *General Sales Office*, Palmolive Bldg., Chicago 11, Illinois.

CONTINUED ON FOLLOWING PAGES ——————▶

K/W Kaiser Aluminum

Aluminum is the answer to Adequate Wiring

LIGHT LOADING DISTRICT—125 FT. SPAN

TENSIONS NOT TO EXCEED THE FOLLOWING LIMITS:

At Max. Load: 30°F., 0 Inch Ice, 9 Lb. Wind + Constant (.05) **50%** of Breaking Strength
Initial . . . . (Before Max. Load): 30°F., No Ice or Wind, **33⅓%** " "
Final . . . . . (After Max. Load): 30°F., No Ice or Wind, **25%** " "

	INITIAL								FINAL									
In. Ice	0		0		0		0		0		0		0		0		0	
# Wind	0		0		0		0		9		0		0		0		0	
°F. Temp.	30		60		90		120		30		30		60		90		120	
Code Word	Power Cond. Size	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.
NEOPRENE TRIPLEX																			
ALL ALUMINUM NEUTRAL MESSENGER																			
Salmon	6	32	110	36	100	39	90	42	85	48	265	38	90	42	85	45	80	48	75
Trout	4	19	260	23	220	27	190	30	165	35	415	24	205	29	175	33	150	37	135
Bass	2	19	375	23	315	27	270	31	230	31	560	22	320	27	270	31	230	35	205
Eel	1/0	22	505	26	435	30	370	34	330	31	745	24	465	28	395	33	340	37	305
ACSR NEUTRAL MESSENGER																			
Perch	6	11	335	13	285	16	235	20	190	27	475	13	295	16	235	20	190	24	160
Carp	4	11	475	14	400	17	320	20	265	23	635	12	455	15	350	19	280	23	235
Shad	2	10	735	13	610	16	475	20	385	19	910	11	695	14	550	18	425	22	355
Barracuda	1/0	11	1100	14	880	17	705	21	575	18	1305	11	1070	15	820	19	645	23	535
REDUCED SIZE ACSR NEUTRAL MESSENGER																			
Tuna	4	15	335	17	290	20	245	23	215	30	490	17	295	20	245	23	210	27	180
Shark	2	14	500	16	430	20	360	23	305	26	680	15	455	18	385	22	320	26	270
Bonefish	1/0	15	735	18	625	21	530	24	455	24	960	16	695	19	575	23	485	26	415
POLYETHYLENE TRIPLEX																			
ALL ALUMINUM NEUTRAL MESSENGER																			
Patella	6	23	110	27	95	31	80	35	70	43	265	30	85	35	70	38	65	42	60
Oyster	4	14	265	17	220	21	180	25	150	32	410	19	195	24	155	28	135	33	115
Thia	2	16	385	19	315	23	360	28	220	29	580	19	320	23	255	28	215	33	185
Purpura	1/0	17	530	21	425	25	355	30	300	27	775	19	465	24	370	29	315	33	270
ACSR NEUTRAL MESSENGER																			
Voluta	6	8	335	10	285	12	220	16	170	24	460	9	295	12	230	16	175	20	135
Periwinkle	4	8	530	10	400	14	305	18	235	21	630	9	455	12	350	16	265	20	205
Uca	2	9	735	11	600	15	460	18	365	19	910	10	695	12	545	16	415	21	330
Conia	1/0	9	1110	10	870	15	675	19	525	17	1305	9	1070	12	800	17	605	21	485
REDUCED SIZE ACSR NEUTRAL MESSENGER																			
Strombus	4	11	340	13	290	15	240	18	190	27	485	13	295	15	240	19	190	24	155
Gebia	2	12	500	14	425	17	345	21	285	25	685	13	455	16	375	20	300	24	250
Ranella	1/0	11	750	14	615	17	500	21	405	24	960	12	695	16	560	19	450	26	365

MEDIUM LOADING DISTRICT—125 FT. SPAN

TENSIONS NOT TO EXCEED THE FOLLOWING LIMITS:

At Max. Load: 15 °F., ¼ Inch Ice, 4 Lb. Wind + Constant (.22) **50%** of Breaking Strength
Initial . . . . (Before Max. Load): 15 °F., No Ice or Wind, **33⅓%** " "
Final . . . . (After Max. Load): 15 °F., No Ice or Wind, **25%** " "

	INITIAL										FINAL											
In. Ice	0		0		0		0		0		¼		¼		0		0		0		0	
# Wind	0		0		0		0		0		4		0		0		0		0		0	
°F. Temp.	0		32		60		90		120		15		32		0		32		60		90		120	
Code Word	Power Cond. Size	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.
NEOPRENE TRIPLEX																									
ALL ALUMINUM NEUTRAL MESSENGER																									
Salmon	6	56	65	59	60	62	55	64	55	67	55	70	260	67	145	62	55	64	55	66	55	69	50	71	50
Trout	4	31	155	35	140	38	130	42	115	46	105	49	415	46	260	38	130	42	120	45	110	48	100	51	95
Bass	2	19	380	22	320	26	270	30	235	34	210	37	635	34	440	24	300	29	250	33	220	37	195	40	180
Eel	1/0	19	585	23	490	26	425	30	370	34	325	33	880	31	658	22	510	26	420	30	365	35	320	38	290
ACSR NEUTRAL MESSENGER																									
Perch	6	9	405	11	350	13	300	16	245	19	205	32	575	26	395	12	325	15	255	18	210	22	170	26	145
Carp	4	10	555	12	465	14	385	17	310	21	260	28	750	23	540	11	485	14	385	17	310	21	255	25	215
Shad	2	9	845	11	700	14	570	17	450	21	365	23	1040	20	795	10	790	13	610	16	485	21	380	25	315
Barracuda	1/0	10	1255	12	1020	15	825	18	660	22	545	21	1450	19	1160	10	1205	13	920	17	725	21	585	25	490
REDUCED SIZE ACSR NEUTRAL MESSENGER																									
Tuna	4	13	385	15	335	17	295	20	250	23	215	35	585	29	405	16	300	20	250	23	215	27	185	30	165
Shark	2	12	575	14	500	17	425	20	355	23	305	29	795	25	595	14	505	17	415	21	345	25	290	28	250
Bonefish	1/0	13	835	16	700	18	605	21	510	26	430	27	1090	24	835	14	765	17	650	21	525	25	445	28	390
POLYETHYLENE TRIPLEX																									
ALL ALUMINUM NEUTRAL MESSENGER																									
Patella	6	48	50	51	50	54	45	57	45	60	40	65	265	61	135	54	45	57	45	60	40	62	40	65	40
Oyster	4	25	150	29	130	33	115	37	100	41	90	46	410	42	245	32	115	36	105	40	95	43	85	47	80
Thia	2	16	385	20	310	24	255	28	220	32	190	36	630	32	430	21	285	26	230	30	200	35	175	38	155
Purpura	1/0	14	625	18	505	22	415	26	345	30	295	30	890	28	650	17	530	22	410	26	340	31	290	35	255
ACSR NEUTRAL MESSENGER																									
Voluta	6	7	410	8	350	9	300	12	240	15	180	30	565	23	385	9	330	11	250	14	195	18	155	22	125
Periwinkle	4	7	580	9	485	10	400	14	305	18	235	25	755	20	535	8	515	11	390	14	305	18	230	22	190
Uca	2	8	845	10	690	12	555	16	430	20	340	22	1035	19	780	8	785	11	605	15	460	19	360	23	295
Conia	1/0	8	1260	10	1025	12	805	16	625	21	490	19	1440	17	1135	8	1210	11	915	14	690	19	530	23	440
REDUCED SIZE ACSR NEUTRAL MESSENGER																									
Strombus	4	9	410	10	355	12	300	15	250	18	200	32	585	26	395	12	315	15	250	18	205	22	165	26	145
Gebia	2	10	580	12	495	14	420	17	345	21	280	28	790	24	580	14	425	15	400	18	325	22	270	26	230
Ranella	1/0	10	850	12	710	15	580	18	470	22	390	24	1080	22	815	11	785	15	590	18	490	22	395	26	335

HEAVY LOADING DISTRICT—125 FT. SPAN

TENSIONS NOT TO EXCEED THE FOLLOWING LIMITS:

At Max. Load: 0 °F., ½ Inch Ice, 4 Lb. Wind + Constant (.31) 50% of Breaking Strength
Initial . . . . (Before Max. Load): 0 °F., No Ice or Wind, 33⅓% " "
Final . . . . (After Max. Load): 0 °F., No Ice or Wind, 25% " "

		INITIAL												FINAL											
In. Ice		0		0		0		0		0		0		½		½		0		0		0		0	
# Wind		0		0		0		0		0		0		4		0		0		0		0		0	
°F. Temp.		−20		0		32		60		90		120		0		32		−20		0		32		60		90		120	
Code Word	Power Cond. Size	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.	Sag In.	Tension Lbs.
NEOPRENE TRIPLEX																													
ALL ALUMINUM NEUTRAL MESSENGER																													
Trout	4	70	70	72	70	74	65	76	65	78	65	80	60	81	415	81	280	74	65	76	65	78	65	80	60	82	60	84	60
Bass	2	44	165	46	155	49	145	52	140	55	130	58	125	60	635	60	445	49	145	51	140	54	135	57	125	60	120	62	115
Eel	1/0	32	345	35	320	38	290	42	265	45	245	48	230	48	935	49	690	37	300	39	285	43	255	47	240	50	225	52	210
ACSR NEUTRAL MESSENGER																													
Perch	6	28	135	31	125	34	110	37	100	41	95	43	90	53	585	51	395	35	110	38	100	41	95	43	90	45	85	47	80
Carp	4	10	530	11	475	14	385	17	325	20	265	24	225	37	915	35	665	14	385	16	330	20	265	24	225	28	195	30	180
Shad	2	8	960	9	870	10	785	13	600	17	470	20	385	29	1305	28	985	10	805	11	695	15	530	18	430	23	340	26	300
Barracuda	1/0	8	1400	10	1260	12	1040	14	840	18	670	21	545	26	1760	26	1365	10	1255	11	1070	15	820	19	645	23	535	26	460
REDUCED SIZE ACSR NEUTRAL MESSENGER																													
Tuna	4	36	140	38	130	41	120	43	115	46	105	49	100	57	585	55	410	42	120	44	115	46	105	49	100	51	95	52	95
Shark	2	15	460	17	420	21	345	23	305	27	260	31	230	41	915	39	680	21	340	23	305	27	260	31	230	34	210	37	190
Bonefish	1/0	11	960	12	880	15	745	17	640	20	540	24	455	32	1380	34	980	14	795	16	695	19	560	23	485	26	415	30	365
POLYETHYLENE TRIPLEX																													
ALL ALUMINUM NEUTRAL MESSENGER																													
Oyster	4	64	60	65	55	67	55	70	55	72	50	74	50	78	410	77	265	68	55	70	55	73	50	74	50	76	50	79	50
Thia	2	41	150	43	140	46	130	49	120	52	115	55	110	58	630	58	440	46	130	49	125	52	115	55	110	57	105	60	100
Purpura	1/0	27	330	30	300	34	260	38	230	42	215	45	200	45	935	46	675	32	275	35	250	40	225	43	210	46	195	49	180
ACSR NEUTRAL MESSENGER																													
Voluta	6	21	130	24	115	28	100	31	90	35	80	38	70	50	585	47	385	30	95	32	85	36	80	38	75	39	70	41	70
Periwinkle	4	7	565	8	505	10	405	13	320	17	250	21	195	35	915	32	650	10	400	12	335	17	250	21	200	25	170	27	155
Uca	2	7	970	8	880	9	730	11	595	15	460	20	330	29	1300	27	975	8	820	10	695	13	525	16	410	21	320	24	275
Cenia	1/0	7	1410	8	1265	10	1025	12	810	16	630	20	495	25	1740	24	1345	8	1267	9	1070	13	795	17	600	21	485	24	415
REDUCED SIZE ACSR NEUTRAL MESSENGER																													
Strombus	4	29	130	31	120	35	105	39	95	41	90	44	85	54	585	51	400	36	100	38	95	42	90	44	85	46	80	47	80
Gebia	2	12	470	14	420	17	340	21	285	24	240	28	210	40	915	38	670	18	330	20	290	24	245	28	210	31	190	34	170
Ranella	1/0	9	975	10	890	12	750	14	615	18	500	21	410	31	1360	29	1040	11	820	12	695	17	540	20	445	23	365	28	310

EXAMPLE:

$$Sag_{(span\ x)} = Sag_{125}\left(\frac{Span\ x}{125}\right)^2$$

Carp — Triplex
2 #4-7 AA — 4/64 Neo.
1 #4-6/1 ACSR Bare Neutral

$$Sag_{(90')} = 17''\left(\frac{90}{125}\right)^2$$

$$= 9''\ (60°\ initial\ sag)$$

WHERE:

90′ = span x
17″ = 60° initial sag for heavy loading district for 125 ft. span.

Send for valuable 22-page triplex booklet

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919 N. Michigan Blvd., Palmolive Bldg.,
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Please send, without obligation, your booklet on Kaiser Aluminum triplex service drops, which includes helpful information on costs, construction practices, fittings . . . plus answers to most-asked questions about triplex service drops.

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THE NATION'S LARGEST PRODUCER OF
ALUMINUM WEATHERPROOF WIRE AND TRIPLEX

Avila Becomes Boston Ed VP

Charles F. Avila has been elected vice president in charge of engineering and construction for the Boston Edison Co, effective immediately. He succeeds the late Chester A. Corney.

A native of Taunton, Mass., Avila was educated at Harvard University, class of 1927, and at the Harvard Graduate School of Business Administration. He holds the degrees of bachelor of science in electrical engineering and in business administration.

He joined Boston Edison in 1929 and has gained wide experience in various departments of the company. He has been actively identified with the work of the transmission and distribution department. He has also been active in connection with atomic energy prospective developments. Since 1954 he has been assistant to the president.

C. F. AVILA

Tacoma City Light Names Head

John D. Ferguson has been appointed superintendent of Tacoma City Light. He succeeds Henry A. Cole who has been transferred to the newly created position of major projects manager in Department of Public Utilities, Tacoma, Wash.

An electrical engineering graduate of University of Washington, Ferguson joined Tacoma in 1938 as a junior wireman. Eight years later he was named supervising engineer in charge of substation designs. In 1954 he became chief electrical engineer for City Light.

J. D. FERGUSON

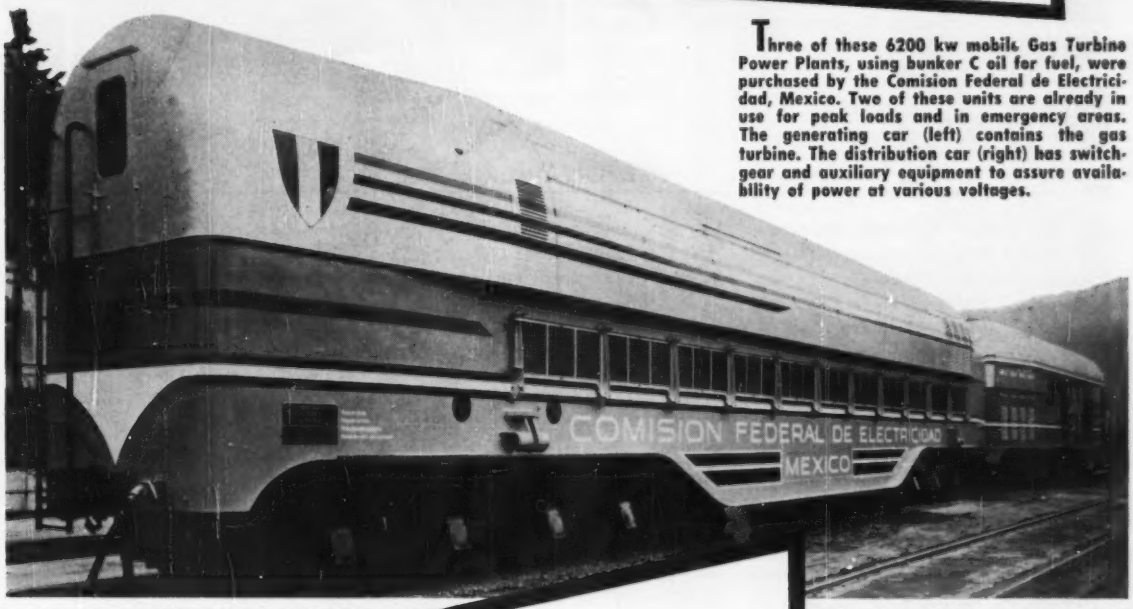
Mesler Named Highway Trailer VP

William J. Mesler, assistant secretary of Highway Trailer Co since 1955, has been elected vice president of credit.

Mesler joined Highway Trailer, a division of the equipment department of Merritt-Chapman & Scott Corp, in 1949 as credit manager. He previously was vice president of Coin Machine Acceptance Corp.

In other company promotions, Curtis N. Christy, supervisor of industrial accounting and budget director was named treasurer, and Baxter L. Schroeder becomes division sales manager.

EXPERIENCE-PROVED...
BROWN BOVERI
MOBILE GAS TURBINE PLANTS



Three of these 6200 kw mobile Gas Turbine Power Plants, using bunker C oil for fuel, were purchased by the Comision Federal de Electricidad, Mexico. Two of these units are already in use for peak loads and in emergency areas. The generating car (left) contains the gas turbine. The distribution car (right) has switchgear and auxiliary equipment to assure availability of power at various voltages.

GAS turbines of the same type as those in Brown Boveri mobile gas turbine power stations have been in stationary service throughout the world for many years.

The vast technical background in the gas turbine field is the reason why every large output Brown Boveri Gas Turbine sets *new standards* for *performance* and *economy*. You owe it to yourself to have the facts on how a Brown Boveri Gas Turbine can help with *your* peak load problems. *Write for data today!*

8 Reasons Why
BROWN BOVERI GAS TURBINES
are IDEAL for Peak Loads!

1— Lower initial cost than comparable steam turbines
2— Smaller space requirements enabling their location at load centers
3— Faster starting time from cold to full load
4— Faster acceleration
5— Lower maintenance
6— Minimum personnel requirements
7— Advanced design backed by 30 years of gas turbine manufacturing experience
8— Proven Performance and Complete Dependability

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Gilbert: Engineer of Year

Ernest M. Gilbert (sitting), honorary chairman of Gilbert Associates, Inc, has received from the Reading Chapter of the Pennsylvania Society of Professional Engineers an award designating him as "Engineer of the Year."

Gilbert was born in Wilton, Conn., and after receiving his technical training in Cornell University he entered the employ of the American Stoker Co. Later he became chief engineer for the Leadville, Colo., Light & Power Co. In 1916 he joined Metropolitan Edison Co. He then became associated with W. S. Barstow, a predecessor of Gilbert Associates.

Harry Potteiger, president, Reading Chapter, said: "We are proud to add 'Engineer of the Year' to his many honors."

PERSONAL BRIEFS

K. M. LaRue has been made residential-rural sales manager of the Kansas Gas & Electric Co . . . Appalachian Electric Power Co has appointed **W. W. Ford, Jr,** to fill the new position of commercial sales promotion representative for the company at Roanoke, Va. Company has promoted **Wilbur C. McMahan** to assistant Charleston district manager. He was formerly an assistant to C. B. Talley, district head at Charleston, West Va.

George D. Gibson and **T. Justin Moore, Jr,** members of the firm of Hunton, Williams, Gay, Moore & Powell of Richmond, Va., have been made associate general counsel and assistant general counsel, respectively, for the Virginia Electric & Power Co.

Albert L. Politsch has been appointed local manager in West Des Moines, Iowa, of the Iowa Power & Light Co, succeeding Ralph A. Fuller retired.

Walter Gillespie, assistant manager of the steam division of the Dayton Power & Light Co, was elected president of the National District Heating Association.

Dayton Power & Light Co has named **William V. Dodds** as supervisor of the home service department, replacing Donald E. Bootes, resigned. **Dale T. Whittridge** has been made assistant supervisor of the dealer promotion department, a new post.

Perry L. Miller, Mullinville, Kan., was selected as the new executive secretary of the Kansas Electric Cooperatives. He is also president of the Flint Hills Rural Electric Cooperative, Council Grove.

Charles H. Bay, supervisor of municipal sales for the Detroit Edison Co, has retired after 41 years of service with the company.

Public Service Co of Indiana has made these changes in the Southern and Western Divisions: **Jim Campbell** has succeeded I. L. Frost, retired, as Seymour District manager. **Charles Uhl** has been appointed manager of Jeffersonville office. **Marvin Heilig** has become Aurora District manager. **William Brown** has been made manager of the Salem area. **S. Lee Smith** was named district manager of the Brazil area.

Robert D. Cleaves has been appointed manager of utility sales for I-T-E Circuit Breaker Co. Company also named **Hugh P. Maxwell** manager of distributor sales.

Burndy Engineering Co has appointed **Irving F. Matthyssee chief** engineer of the Utility-Industrial division.

Jack R. DeBacher has been elected a full vice president of Thor Power Tool Co . . . **Harold H. Fahnoe,** formerly engineering manager for switchgear distribution apparatus at Westinghouse Electric Corp, has joined S&C Electric Co to serve as manager-administrative engineering.

McChesney Gets Nuclear Post at RG&E

Rochester Gas & Electric Corp has promoted Irvin G. McChesney to manager of nuclear energy research. He has been the company's representative with Atomic Power Development Associates and has worked actively on the nuclear project in Detroit for three years.

Associated with RG&E for 33 years, McChesney has been assistant superintendent of electric operations and planning since 1950. He was loaned in 1953 to APDA for work on its proposed fast breeder nuclear plant.

Sell running water to increase power loads

Every installation of a Fairbanks-Morse electric water system opens the way for the sale of *more power*.

Families with new water systems almost immediately begin buying load-building appliances including electric refrigerators, water heaters for the milkhouse and home . . . electric stock water fountains . . . washers . . . driers . . . ironers . . . milk coolers . . . pipe thawers . . . dishwashers . . . and garbage disposers.

We have a cooperative plan

Homes and farms which do not have electric water systems are *prime sales targets* for power producers and Fairbanks-Morse. Our field-tested educational program can help us both. It includes panel displays, wall charts and literature that get prospects interested in buying an electric water system and other appliances. This material is used with telling effect in window and store displays, at meetings and country fairs. For details, mail the coupon today.

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Fairbanks, Morse & Co., Dept. EW-625
600 S. Michigan Ave., Chicago 5, Ill.

Gentlemen:
Please tell us how we can avail ourselves of Fairbanks-Morse's promotional material to help increase our power load.

Company name.....

Your name.....

Address.....

City.....State.....

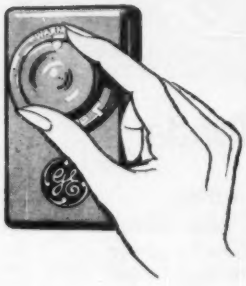
G-E ELECTRIC RADIANT

a winter load that can improve annual

There are many utilities in the country which are considering electric house heating as one means of developing winter residential load to improve their annual load factor.

But what new problems does electric house heating present? Which types of electric heating should the utility promote? When and how should it be done? These and other questions must be answered before the utility can proceed.

In electric radiant heating, as developed by General Electric, many utilities are finding a practical, profitable and immediate answer to such questions. Here are some of the characteristics that make electric radiant heating a favorable type of load for them:



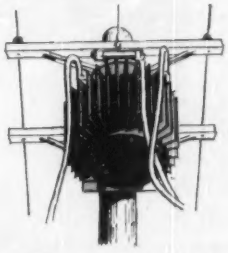
1 DIVERSIFIED DEMAND—Each room in each house has its own complete heating system, controlled by its individual room thermostat. The varying power requirements for each room, together with the varying requirements for each house make electric radiant heating a well-diversified load. Operating data so far available on electric radiant heating load characteristics show that peak demand does not exceed 70% of total connected load for an individual home, and for a group of homes, is considerably less than 70%.

2 NIGHT-TIME LOAD—The biggest part of the residential heating load occurs during the evening and early morning hours when industrial load is normally lighter.

3 BALANCES COOLING LOAD—For utilities that have a heavy summer air-conditioning load, electric radiant heating can be used to build winter load and improve annual load factor.

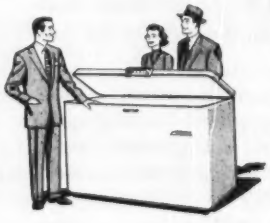
4 A RESISTANCE LOAD—Electric radiant heating is a unit power factor load, and from this viewpoint is a most desirable type load for the power company because it is free of power factor problems.

5 A PERMANENT LOAD—Once the electric heating load goes on the line, it is usually there for the life of the house.



6 WINTER EFFICIENCY—Because of lower ambients, system capability is more effectively used during the winter months when electric heating is required.

7 LARGE POTENTIAL MARKET—G-E electric radiant heating is practical for new homes, whether ceilings are plaster or dry-wall construction. In addition, supplemental or additional heat may be installed in either new or old homes by using G-E baseboard resistance heaters.



8 BETTER CUSTOMERS—Experience has shown that the residential customer in a house equipped with electric radiant heating becomes a better customer for the utility for all other electrical services. Consequently, electric radiant heating is another step in the direction of the all-electric home.

9 PEOPLE WANT IT—The enthusiasm home owners have for electric radiant heating not only opens up the whole residential heating market as a new source of revenue for the utility, but also — because it gives the utility a higher stake in providing services necessary for modern living — makes the utility a still more vital factor in the life of the communities it serves.

HEATING FOR HOMES

load factor for utilities which have summer peaks

G-E ELECTRIC RADIANT HEATING OFFERS MANY BENEFITS TO UTILITY CUSTOMERS

Practical — Ceilings provide a large unobstructed area for the radiating surface, efficiently radiating heat and warming objects and surfaces in the room. Through conduction, all these heated surfaces heat the air to a comfortable level. And, because G-E electric radiant heating is installed entirely within ceilings, building space that would otherwise be needed for heating equipment and fuel-storage can be devoted to living space. Also the expenses of a chimney can be eliminated entirely in homes that are equipped with G-E electric radiant heating.

Comfortable — Radiant heat from above is nature's way of heating. It provides complete comfort at lower room air temperatures. Practically eliminates drafts or air currents. Assures a comfortable humidity ratio because it doesn't "dry out" the moisture content of the air. All temperatures within the room are remarkably constant, with little variance between floor and ceiling.

Clean — With G-E electric radiant heat there is no dirt, soot, or dust from combustion or from circulating currents of air. Walls, ceilings, drapes, and furnishings stay clean and fresh much longer.

Convenient — The G-E electric radiant heating system has no rotating parts, operates without making any sound at all. No annual servicing plan is required, no refueling or checking of fuel supplies. Because there are no radiators or wall heaters, furniture and decorating can be arranged where and as desired.

Flexible — Individual room thermostats permit the temperature of each room to be controlled as desired. And because each room has its own thermostat, any changes in wind or sun that affect one or two rooms will be compensated for by the individual heating systems in those rooms. Here are all the advantages of zone control carried to the ultimate of room by room control.

Residential customers will like and want this new way of heating homes once they are acquainted with its many benefits. Consequently utilities which now have a summer peak are presented with a good opportunity to improve their load characteristics by promoting electric radiant heating.

For utilities interested in this electric heating load, the General Electric Company has prepared a portfolio of educational and sales helps. Included are technical data required for specifying and installing electric radiant heating systems, suggestions for utility sales programs, builder and consumer information, and samples of available promotion literature and display cards. Write Wiring Device Department, General Electric Company, Providence 7, Rhode Island.

Progress Is Our Most Important Product

GENERAL ELECTRIC

SEND FOR UTILITY PORTFOLIO on G-E Electric Radiant Heating. Contains a complete file of educational and sales helps — technical data as well as promotion material — for utilities interested in this type of heating load.

Wiring Device Department
General Electric Co., Providence 7, R. I.

Please send me a copy of the "Sales Portfolio on G-E Electric Radiant Heating".

Name.....

Company.....

Address.....

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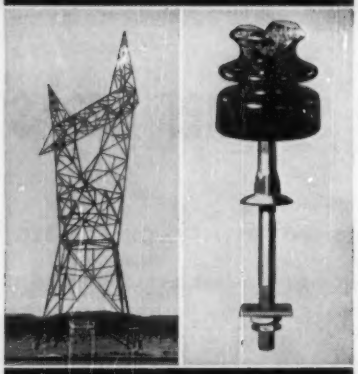
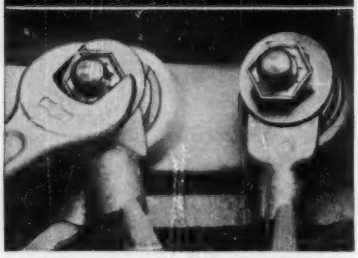
Assemblies stay tight!



Connections stay tight!



—when locked with

PALNUT LOCK NUTS

FOR years, PALNUTS have been the standard lock nuts of the utility industry—on steel towers, wood pole hardware, connectors, disconnects, switches, fittings, transformers, etc. Here's why: PALNUT Lock Nuts stay tight under severest vibration, are very low in cost, apply fast and easily, require little space. Available in full range of sizes, in plain, Parkerized and Hot Dip Galvanized steel; also silicon bronze.

Samples and literature on request.

THE PALNUT COMPANY

51 Glen Road
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PALNUT
TRADE MARK
LOCK NUTS
for quick, secure fastening at low cost

Two Challenges for Utilities:

• Young men must be developed into good managers and qualified technicians to meet future needs

• Managers must sell such important products as "themselves as bosses . . ."

Electric utilities can win tomorrow's game only by attracting more young men and developing them into good managers and qualified technicians in all phases of the industry's business.

This primary goal of management was presented by Frank McLaughlin, president, Puget Sound Power & Light Co, to the joint annual conference of the business development and personnel and safety sections of the Northwest Electric Light & Power Association meeting recently in Seattle.

Speaking to present employees, McLaughlin said that management expects each to remain steadfast in his dedication to public service.

Everything of any consequence in America during the past 75 years has happened because of or in terms of electricity, said John T. Kimball, Idaho Power Co. The "Live Better Electrically" program in the future, he said, is going to be so overwhelming in terms of human welfare as to be unbelievable. Kimball went on to urge the industry to fight further government encroachment at all levels, consolidate its position with the public, and lift itself in manpower by the bootstraps.

Management must step up to the job of selling, DeWitt Pike, Rochester Gas & Electric Co, told the group. Among the products which supervisors and the management team have to sell, Pike pointed out, are (1) themselves as good bosses, fair minded in decisions, cooperative and friendly in daily associations; (2) management, as the leadership operating in the best interests of all employees; (3) the companies, as good, reliable and challenging places to work; (4) our American free-enterprise system as the best way of doing business; (5) the employee's job, as an interesting operation that contributes to productivity; (6) productivity, as the only real means of raising wages and standards of living.

Basic to this job of selling, explained Pike, is effective communication between management and employees, which is the key to the highest form of human efficiency. The cost of effective communications is higher than is commonly supposed.

In selling electric heat for industrial use, we must make a package and sell it, Ted Kinney, Western Factors, Seattle, told the commercial and industrial bureau. There is a need for better equipment, especially in controls, he said.

In selling electric heat for industrial commercial steam boilers, sell the best, suggested Sidney N. Coates, Coates Electric, Seattle. Sell advantages, not operating costs, he said, including such items as control, safety, need for less insurance, and space saving.

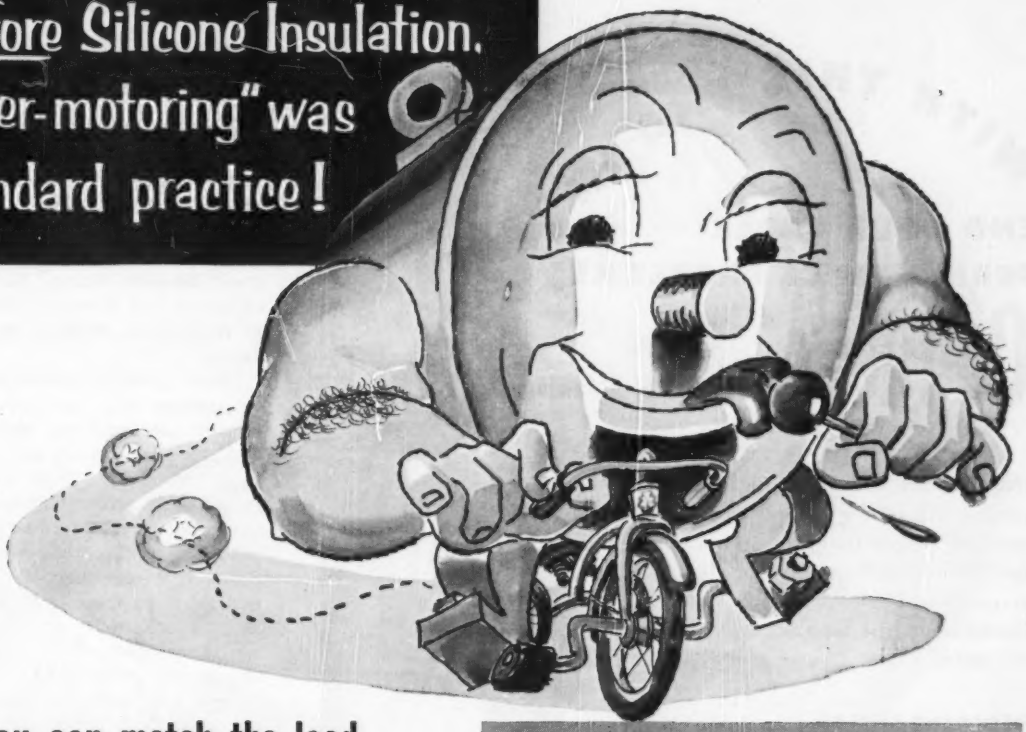
The trend to automation is and will be a key factor in industrial load growth, declared Dwight E. Moorehead, General Electric Co, San Jose, Calif. It is believed by 1964, he pointed out, that well over 90% of the nation's manufacturing horsepower will be electric.

Today 50% of all power generated nationally goes for commercial and industrial lighting, remarked P. W. Smith, Westinghouse Electric Corp, Salt Lake City. Today's market is in modernization, not new construction, and it's a $9-million market, he declared. It will bring $1 million in new revenue by 1956, he predicted.

We must have a program to sell electric commercial cooking, Dean Skall, Hotpoint Co, said. Pre-selling is important so that customers will ask dealers for electric equipment, he commented, pointing out that replacement of old electric equipment is a good market and that advantages of electric cooking should be taught to dealers.

During the conference, A. S. Gilbert, Idaho Power Co, was named to succeed Kimball Jack, Washington Water Power Co, as head of the business development section. Leading the personnel and safety section will be W. E. Gordon, Portland General Electric Co, succeeding Russel B. James of the same company.

Before Silicone Insulation, "over-motoring" was standard practice!



Now you can match the load . . . let silicones carry the overloads

Lazy motors cost money! Why continue to pay a fat premium for motors that make kid's play of their average work load? Today, you can save money by using *silicone insulated* motors rated to *match your average load*. Their built-in service factor of 25 to 50% will handle most intermittent overloads or loads that can't be matched in standard frame sizes.

Cut your capital investment and installation costs! Think of it—for every dollar dumped into *unused* motor capacity, you spend an extra $3 for starters, cable, transformer capacity and installation costs.

Enjoy more continuous production! You can depend on motors insulated with Dow Corning silicones to have maximum resistance to such motor killers as heat, moisture and corrosive atmospheres.

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R. G. LeTourneau, Inc. of Longview, Texas, installs a silicone insulated d-c motor in each of the 24 electric wheels of the giant "Sno-Freighter." Silicone insulation is used to give maximum power per pound under tough operating conditions. The silicone insulated motors, located in tubular axles and connected through a gear train in the wheel hubs, demonstrate the advantages of placing the power unit close to the work . . . a basic principle made practical by the heat stability of Dow Corning silicone dielectrics.

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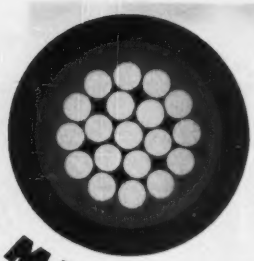
FRANCE: St. Gobain, Paris

WITH THIS END IN MIND . . .



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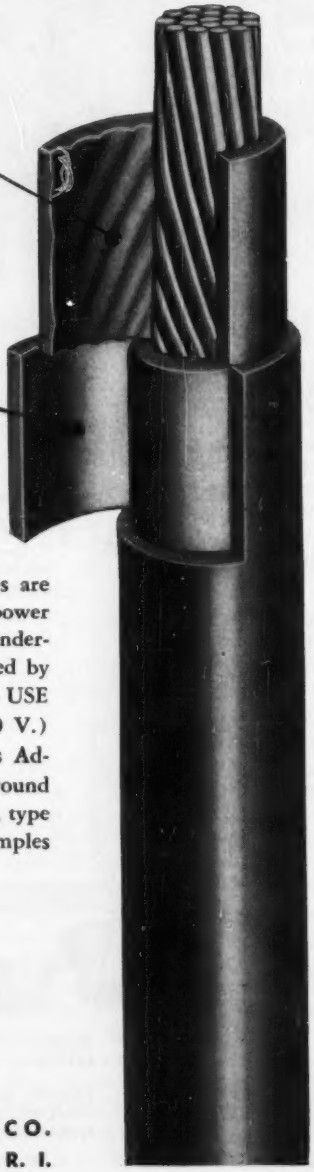
NEOPRENE SHEATH . . . eliminates need for lead or metallic armor. Vulcanized under pressure for added toughness, density, and smooth surface . . . easy to pull, tap, and splice. Offers high resistance to abrasion, heat, flame, moisture, sunlight, earth acids and oils.



These versatile Collyer Suprene Cables are designed for the efficient distribution of power on aerial, direct-burial, conduit, and other underground network systems. They are approved by Underwriters' Laboratories, Inc., for Type USE (Underground Service Entrance Cable, 600 V.) applications, and by the Civil Aeronautics Administration for use as non-metallic underground cable for airport lighting (CAA Spec. L824, type A). Request complete specifications and samples today, or write for Catalog 150.

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In the Senate:

"We're going to knock Idaho Power's 3-dam project into a cocked hat . . ."

The Senate soon will enact legislation intended to change the entire outlook for hydroelectric development of the Snake River in Idaho, Democratic Senators Robert S. Kerr of Oklahoma and Warren G. Magnuson of Washington, predicted recently at Seattle.

"We're going to authorize federal construction of a high dam in Hells Canyon and knock the Idaho Power Co's three-dam project into a cocked hat," said Kerr. "When this bill is passed by the Senate, the Idaho Power Co should recognize it has a red flag to halt any further work on the Snake River. If the company doesn't, it will find it will be spinning its wheels instead of turbines."

The Senate action is planned as part of national Democratic strategy to force an issue in the fight over whether the Snake River developments should be carried out by public or private enterprise, Magnuson said, adding that "Idaho Power would be paid for any losses." This strategy calls for both branches of Congress to enact a bill to authorize federal construction. Both senators believe the bill will pass the Senate. And Democratic leaders in the House have agreed to pass it "if they have time in the present session," said Kerr.

The legislation would direct the Federal Power Commission to cancel Idaho Power Co's license to construct three low dams, which Magnuson admitted might lead to a long court suit initiated by the company. It will have important influence in senatorial races this fall in Washington, Oregon, Idaho, and Montana, the two senators predicted. Magnuson will be a principal in one of those races, with Gov Arthur B. Langlie as his Republican opponent.

More Power for Cleveland

A 250,000-kw turbogenerator has been slated for installation at Cleveland Electric Illuminating Co's Ashtabula Plant. The new unit will be in addition to four 60,000-kw generators now operating at the plant in northeast Ohio.

THE KEY PART

Just as the structure of this puzzle depends on *one* essential part, so can the IBM punched card serve as the key to *all* data processing for Public Utilities.

Making maximum use of your IBM punched card equipment not only gives you maximum efficiency *now*, it also helps prepare you for progress in electronic data processing *tomorrow!*

If your equipment is currently at work on less than 40 applications, there is room for profitable improvement. For a fresh look at *your* data processing picture, call your local IBM representative or send for these free illustrated folders—today! Write: PUBLIC UTILITIES DEPARTMENT A56, International Business Machines Corporation, 590 Madison Avenue, New York 22, N.Y.

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"seven league boots"...

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JERSEY CENTRAL POWER & LIGHT CO.

through the SUPERVISORY CONTROL SYSTEM

installed by

CONTROL CORPORATION

When storms struck the recreation area served by Jersey Central Power and Light Company it often became a two hour job to reach the remote substation to manually operate the 34.5 KV feeder line circuit breakers.

Now Supervisory Control does the job in seconds . . . with newly installed Control Corporation Supervisory Control System and a single leased wire. One man has an instantaneous and complete visual picture of every circuit breaker at all 10 substations . . . a total of 50 circuit breakers in all. By a flip of the switch the operator can check or operate any circuit breaker over the 45 mile feeder line. Service is restored in seconds instead of hours.

Control Corporation equipment is not new to Jersey Central Power and Light Company. This new installation compliments their complete Supervisory Control and Telemetering System used to control their six large substations from Allenhurst, New Jersey.

Control Corporation has been specializing in supervisory control and telemetering for twenty years. Put these many years of specialized experience to work for you. Our experienced engineers will be glad to make engineering recommendations and give you price estimates. Write to CONTROL CORPORATION, 723 N.E. Central, Minneapolis 14, Minnesota.

Automatic and Supervisory Control
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EXPERIENCED FIELD ENGINEERS IN PRINCIPAL CITIES

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The nameplate of Quality MINNEAPOLIS

• Super-Trol • Peak-Trol • Telemetering • Battery Chargers • Carrier Current

Land Squabble

. . . involves Tenessee farmer who wants $3,000 an acre for site of municipal plant

In one of its final steps before starting the construction of a proposed $135 million municipal electric power plant, the Memphis Light, Gas & Water Commission has authorized condemnation proceedings to acquire a 400-acre site near Memphis, Tenn.

The owners of the land, John and Joseph Gallina of Horn Lake Road and the LG&W have been unable to negotiate an agreeable price.

John Gallina said he had been offered $350 an acre but that "it couldn't be a more ridiculous figure."

"We've had the land for more than 10 years and spent more than $1,000 an acre improving it. In fact we make more in one year off an acre of land than they are willing to pay for it."

He said he considers the land worth $3,000 an acre for farming. The land is used for truck farming and for regular crops such as cotton.

Normal condemnation procedure calls for a petition to be filed in Circuit Court and a Jury of View appointed to appraise the value of the land. If the Jury of View's appraisal is unacceptable, the case goes into a regular Circuit Court hearing.

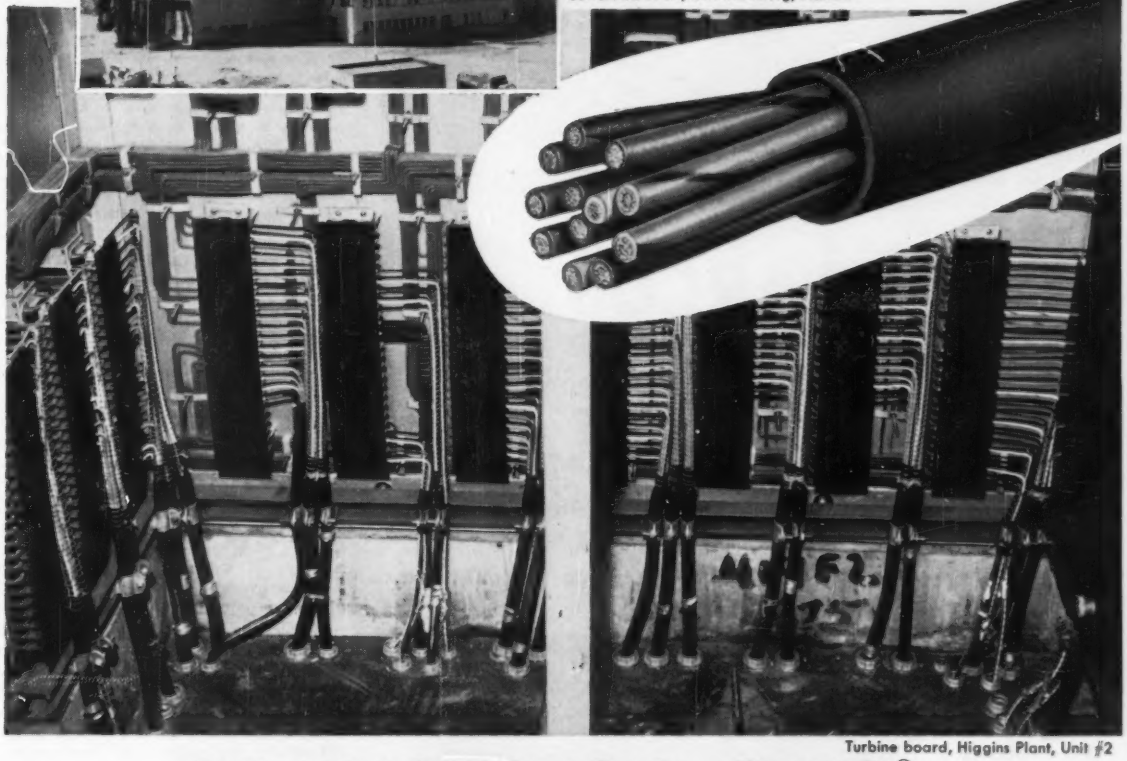
However, work actually may start on this project before a court decision on the price is reached.

In another action related to the proposed 750,000-kw electric power plant, the LG&W Commission opened bids for the sinking of test piling on the site. The apparent low bidder was Raymond Concrete Pile Co of New York which bid $24,800.

Maj. Thomas H. Allen, LG&W Commission president, said the piles will be sunk to about 80 ft where test borings have established a firm sub-stratum. Further tests will determine the amount of weight the soil will withstand.

Allen said the feasibility report being prepared by Burns & Roe, consulting engineers, is nearing completion and will be available soon for Salomon Bros. & Hutzler, New York financial firm which has been retained to manage sale of the revenue bonds, in preparing a prospectus. Officials have expressed hope the bonds can be marketed before Sept. 1.

Suwannee Plant, St. Petersburg, Florida



Turbine board, Higgins Plant, Unit #2

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EXPANDS CAPACITY

USES ROCKBESTOS PNR®

SMALL DIAMETER CONTROL CABLE

Since 1946 Florida Power Corporation has been expanding its generating capacity so that at the end of 1955 it had a net generating capacity of 507,628 kw.

To insure safe dependable operation of its control circuit Florida Power Corporation installed 207,600 ft. of No. 9AWG Rockbestos PNR Small Diameter Control Cable.

You, too, can benefit with Rockbestos PNR. This outstanding control cable lets you pull 12 conductors in conduit where before you had only seven. You save conduit and fittings . . . cut installation costs. Get the full story today. Write or call your nearest Rockbestos Field Engineer.

*Average determined by comparison with conventional control cable.

PROPERTIES OF PNR

46% smaller in area* . . . 28% smaller in diameter* than conventional control cable.
Use smaller conduit and fittings or put more conductors in existing conduit.
Lighter, easier to handle, store, ship, pull through conduit.
Dielectric breakdown . . . over 40 times operating voltage.
Rated 600 volts . . . conductor operating temperature 167°F.
Flexible from 167° to —67°F.
No cracking!

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A financial giant, the new Texas National Bank rises on the fabulous Texas Gulf coast. Marcus transformers provide "money in the bank" dependability for power and lighting distribution. For trouble free performance and greater profits, choose Marcus for your next transformer installation.

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A COMPLETE LINE OF DRY TYPE AND LIQUID-FILLED TRANSFORMERS THRU 5000 KVA

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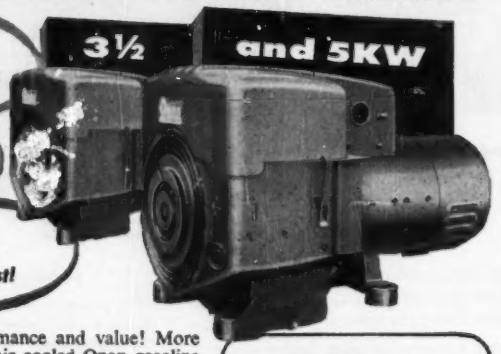
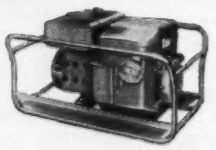


Way ahead in performance and value! More powerful, two-cylinder, air cooled Onan gasoline engines of 4-cycle, horizontally-opposed design give smooth, quieter, effortless performance. Short stroke and moderate speed cut engine wear, give longer life. Quality features include rotating Stellite-faced exhaust valves, solid Stellite valve seat inserts, full pressure lubrication. Onan's exclusive Vacu-Flo cooling system available for difficult or "buried" installations.

Completely Onan-built, with Onan gasoline engines direct-connected to Onan all-climate generators in compact, rugged units. Available in stationary, portable and standby models with a wide range of accessories.



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BOOKS

Books Received Since May 18

Radio Electronics. By Samuel Seely. Published by McGraw-Hill Book Co., 330 W. 42nd St, New York 36, N. Y. 487 pages, illustrated. Price $7.00.

Elektro-Technisches Englisch. By Henry G. Freeman. Published by W. Giradet, Abt. Buchverlag, 22 a Essen, Gerswidastrabe 2, Germany. 491 pages. Price 34.80 DM.

Electronics in Industry. By George M. Chute. Published by McGraw-Hill Book Co., 330 W. 42nd St, New York 36, N. Y. 431 pages, illustrated. Price $7.50.

Principles of Electronics. By L. T. Agger. Published by St. Martin's Press, 103 Park Ave, New York 17, N. Y. 340 pages, illustrated. Price $5.00.

Farm Electrification. By Robert H. Brown. Published by McGraw-Hill Book Co, 330 W. 42nd St, New York 36, N. Y. 367 pages, illustrated. Price $7.00.

Random Processes in Automatic Control. By J. Halcombe Landing, Jr. and Richard H. Battin. Published by McGraw-Hill Book Co., 330 W. 42nd St, New York 36, N. Y. 434 pages, illustrated. Price $10.00.

Nuclear Engineering Clarified

Principles of Nuclear Reactor Engineering. By Samuel Glasstone. Published by D. Van Nostrand Co, Inc, 257 Fourth Ave. New York 3, N. Y. 861 pages, illustrated. Price $7.95

This book provides an over-all view of the vast subject of nuclear technology. It assumes that the reader has a knowledge of calculus and elementary nuclear physics.

First part of the book is devoted to reactor theory; the middle, to reactor control and components (fuel, shielding, materials, etc . . .); and the last to reactor plants and systems. It is extremely well documented with cross references and numerous illustrations. Ample examples demonstrate technical points.

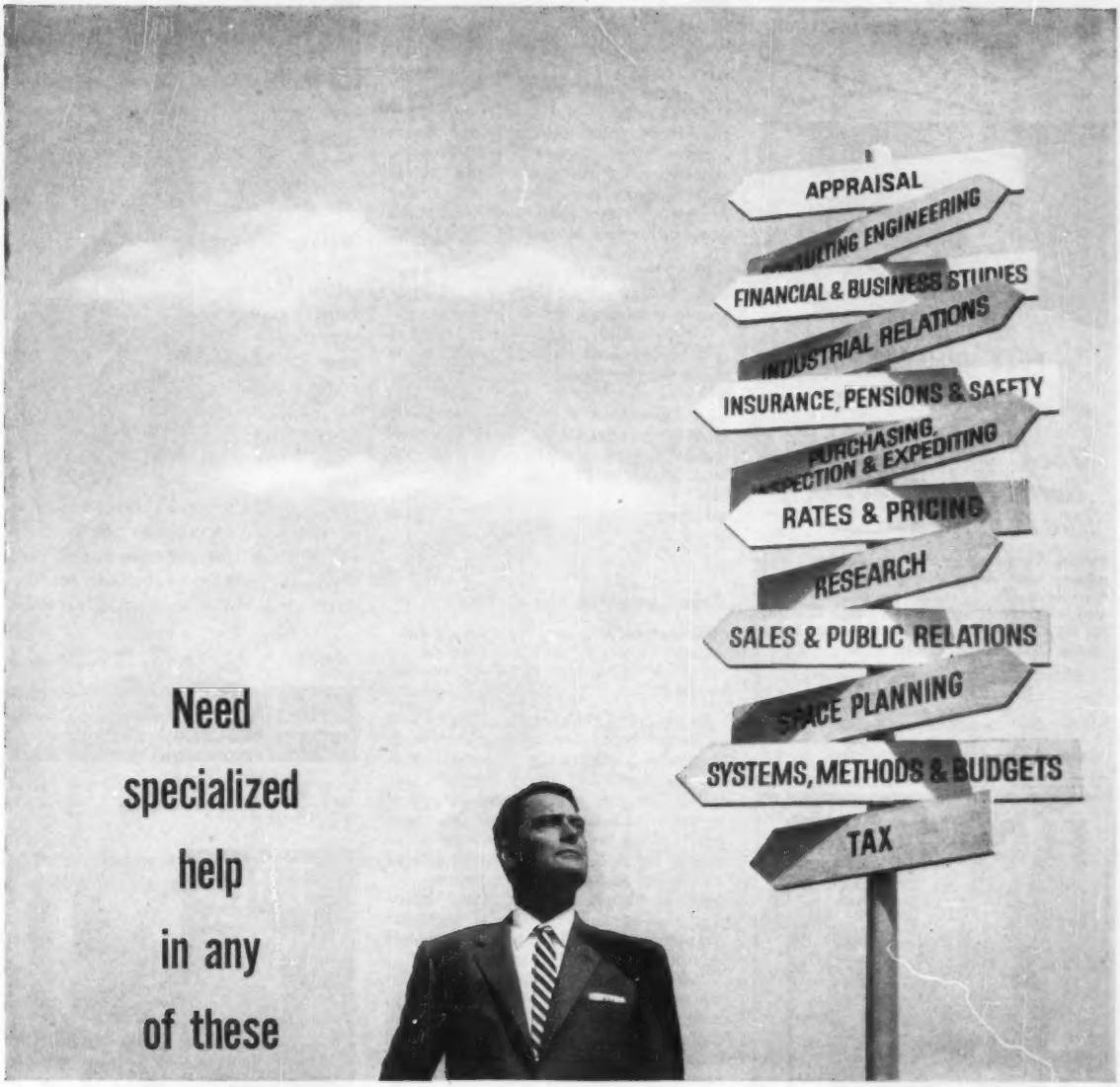
This text is outstanding because it brings together in one volume, a vast amount of reactor information—previously scattered in individual papers and reports. It is a "must" for anyone who intends to enter the nuclear field. It can also serve as both an introduction and reference book for the practicing engineer who wishes to know something about the impact of nuclear reactors on his field.

Color Standardized

The ISCC-NBS Method of Designating Colors and a Dictionary of Color Names. By Kenneth L. Kelly and Deane B. Judd, National Bureau of Standards, U. S. Dept of Commerce. Published by Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C. 162 pages, illustrated. Price $2.00.

Here at last is a comprehensive reference on color. It reconciles the nomenclature of biology, drugs, chem-

(*Continued on page* 268)



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Ebasco technicians are at your call anywhere and anytime you need them, for assignments large or small in any phase of utility operation.

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Books

(*Continued from page* 266)

istry, fashions, decorating, and printing all in terms of the Inter-Society Color Council—National Bureau of Standards color designations. Basis for the reconciliation is the Munsell renotation of color according to its three dimensions, viz: hue (color group), value (lightness), chroma (saturation or intensity). The book also describes methods for determining the color designation of dry powders, opaque solids, liquids, and microscopic specimens.

Utilities and manufacturers will find this book valuable as a guide in their home service operations, particularly when representatives are called upon to discuss color with customers. Their employees who dabble in decorating would benefit also from the clarity with which it identifies a variety of color names used by paint and fabric suppliers.

Automation in the Office

Office Work and Automation. By Howard S. Levin. Published by John Wiley & Sons, Inc, 440 4th Ave., New York 16, N. Y. 203 pages, illustrated. Price $4.50

It has been said that the 1950's will be remembered for buttons that push themselves. Certainly automation is making itself felt today through machines for gathering, comparing and presenting information for management. This book discusses new tools which aid executives in the job of managing and explores ways they are used to obtain more effective information. It defines terms, explains fundamentals, and sketches potentials in a non-technical manner.

Key chapters discuss techniques by which information is gathered and made available for mechanized processing, treat electronic computers and their impact on business data processing and the problems of introducing computers into business systems. Here, too, are the fundamentals underlying determination of computer feasibility and selection among competing machines.

Operatings research, the scientific appraisal of administrative effectiveness, and some of its techniques are explored. These involve physical, social and behavioral sciences. A final chapter, unusual in books of this type, looks at the combined effects of common language, computers, and operations research on the office. It recognizes in its present early stage the significant effects being wrought on control of business activity, organizational patterns, accounting practices and the clerical labor force.

In its attempt to balance information, encouragement and caution in the application of automation to the office, this new book provides a needed service to management.

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INSTALL THEM FORGET THEM
Engineered for Extra Years of
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Walker Selenium Rectifiers are engineered and built to give *extra* years of service and inexpensive operation. They are highly efficient, have a power factor of 97% and a DC ripple of approximately 4%. All Walker Rectifiers are low priced. Only the highest quality components are used. Any number of rectifiers may be paralleled. Write for full details, today.

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TRANSFORMER
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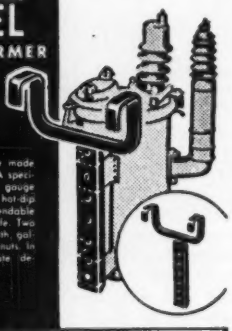

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T-1	3-15 KVA	9 KVA	16¼ lbs.
T-2	25—37—50 KVA	15-45 KVA	37½ lbs.

C-TYPE HANGERS
Two sizes - for 75-100 KVA 1 phase and 75-112½ KVA 3 phase transformers.

HANGER-KICKERS
In sizes to fit T-type Hangers — in four and five mounting positions.

Electrical Fasteners That Hold . . .

THIEL TOOL & ENGINEERING CO. INC.
1417 No. Market St. • St. Louis 6, Mo.

RADIO'S ONE-WAY STREET

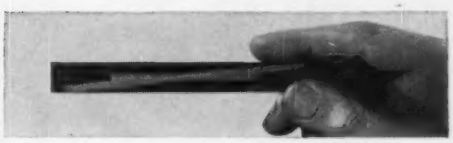
Dr. S. Weisbaum assembles an isolator which he developed for use in a new microwave system. Dr. Weisbaum is a Ph.D. in microwave spectroscopy from New York University. He is one of many young men at Bell Laboratories applying the insight of the physicist to develop new systems of communication.

New radio relay systems for telephone and television now in the making will employ an ingenious device invented by Bell scientists. The device, known as an "isolator," senses which way microwaves are traveling through a waveguide, and stops those going the wrong way.

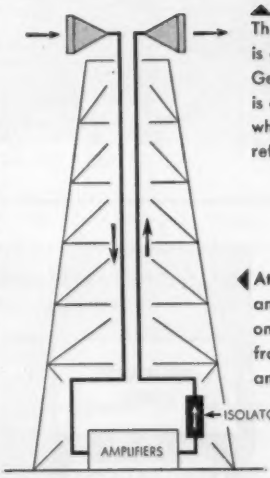
In the new systems a klystron wave generator sends signals through a waveguide to the antenna. The klystron must be shielded from waves reflected back along the waveguide by the antenna. The isolator stops reflections, yet allows the transmitted signals to go through clear and strong.

This isolator is a slab of ferrite which is mounted inside the waveguide, and is kept magnetized by a permanent magnet strapped to the outside. The magnetized ferrite pushes aside outgoing waves, while unwanted reflected waves are drawn into the ferrite and dissipated. This "field displacement" action results from the interplay between microwaves and a ferrite's spinning electrons. Bell physicists discovered this action during their fundamental studies of ferrites.

This is another example of how Bell Telephone Laboratories research works to improve American telephony and telecommunications throughout the world.



▲ The heart of the isolator is a ferrite slab. Geometric pattern is a carbon layer which dissipates reflected signals.

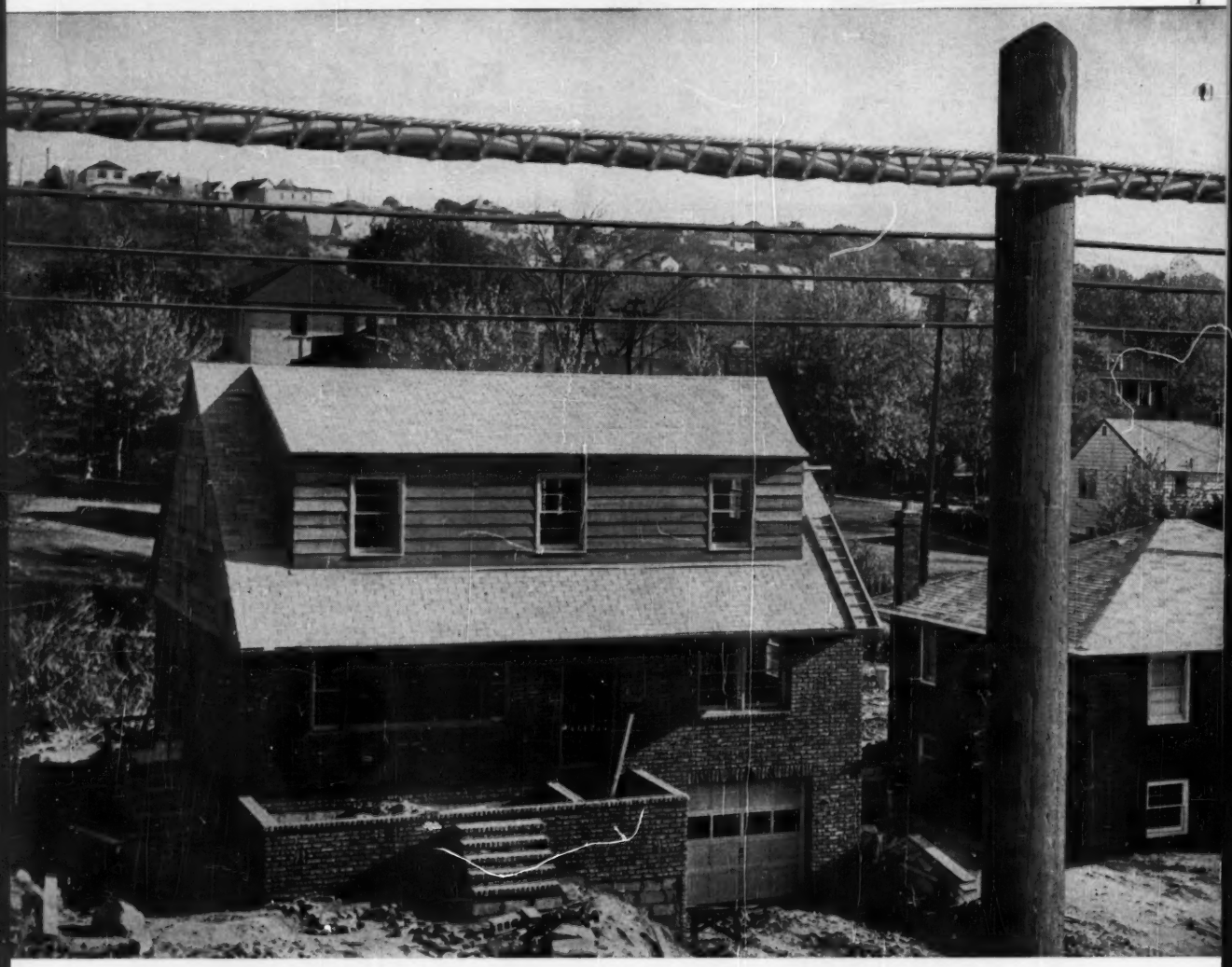


◀ At a radio relay station an isolator assures one-way transmission from the output of the amplifier to the antenna.

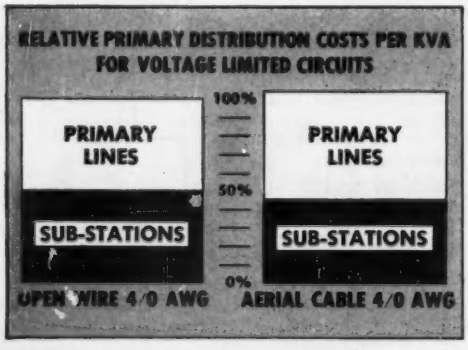
BELL TELEPHONE LABORATORIES

WORLD CENTER OF COMMUNICATIONS RESEARCH AND DEVELOPMENT

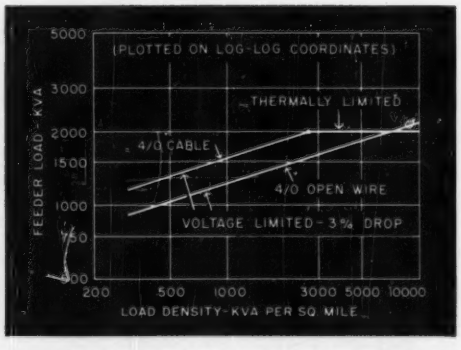
Get more load area coverage for



4/0 AERIAL CABLE vs 4/0 OPEN WIRE

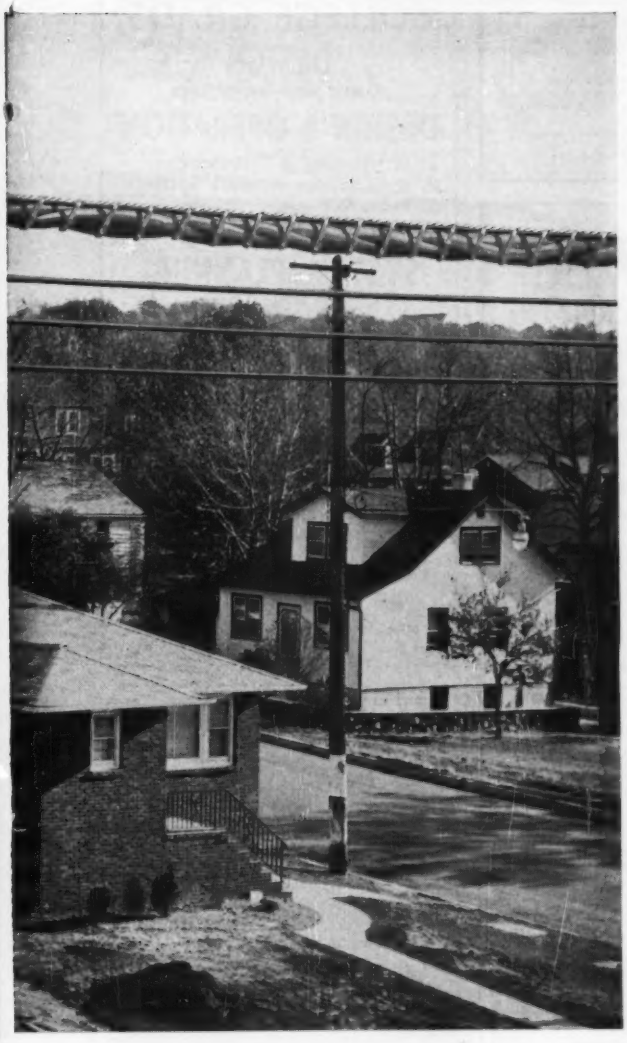


COST—Comparative primary distribution costs per kva for voltage limited circuits at 4160 volts.



FEEDER LOADING—Load density characteristics of 4160-volt feeders with 3% voltage drop limitation.

growing residential areas with



GENERAL ELECTRIC
AERIAL CABLE

General Electric Super Coronol* aerial cable installations can help you meet increasing power demands in growing residential areas. Because of their lower reactance, these preassembled cables can carry far more load within a permissible voltage drop than open wires of the same conductor size. This means that larger areas can be covered than with open wire construction in voltage-limited distribution lines with these results:

1. Reduction in number of feeders required.
2. Use of larger substations.

Both of these advantages result in lower cost per kva of installed substation capacity.

The graphs at lower left show why the initial cost of an aerial cable installation, considered on a realistic basis of cost per kva of load (instead of cost per mile of line) is only 3 to 12% more than for open wire.

In addition, G-E aerial cable gives you:

BETTER APPEARANCE because crossarms, insulators, and unsightly open wire lines are eliminated.

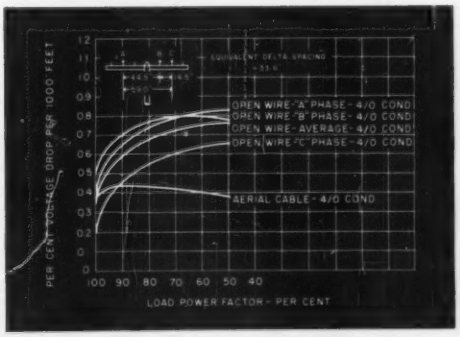
LOWER MAINTENANCE COSTS because there is less chance for storm damage, less need for tree trimming.

FEWER OUTAGE REVENUE LOSSES because messenger-supported cables are far less vulnerable to damage by weather and falling trees. Better service continuity improves customer relations.

INCREASED LOADS. Greater loads can be carried on voltage-limited 4160-volt feeders, up to a load density of 7500 kva per square mile, because of the combination of the low reactance and 85 C copper temperature of G-E Super Coronol preassembled aerial cable.

For additional facts send for a copy of "Economic Performance of Aerial Cable for Distribution Systems." Address Section W171-627, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

*Registered Trade-mark General Electric Company.


PER CENT VOLTAGE DROP PER 1000 FEET
OPEN WIRE-"A" PHASE-4/0 COND
OPEN WIRE-"B" PHASE-4/0 COND
OPEN WIRE-AVERAGE-4/0 COND
OPEN WIRE-"C" PHASE-4/0 COND
AERIAL CABLE-4/0 COND
100 90 80 70 60 50 40
LOAD POWER FACTOR-PER CENT

VOLTAGE DROP—Voltage regulation per 1000 feet 4160-volt feeders, 1000 kva base, 3 phase.

Progress Is Our Most Important Product

GENERAL ELECTRIC

EMPLOYMENT OPPORTUNITIES

The Advertisements in this section include all employment opportunities—executive, management, technical, selling, office, skilled, manual, etc.

Positions Vacant | Civil Service Opportunities | Employment Agencies
Positions Wanted | Selling Opportunities Wanted | Employment Services
Part Time Work | Selling Opportunities Offered | Labor Bureaus

DISPLAYED —RATES— **UNDISPLAYED**

The advertising rate is $19.15 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on a column—3 columns—30 inches to a page.

Subject to Agency Commission.

$1.50 per line, minimum 3 lines. To figure advace payment count 5 average words as a line.

Box Numbers—counts as 1 line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Not subject to Agency Commission.

Send NEW ADS to Classified Advertising Div. ELECTRICAL WORLD, P. O. Box 12, N. Y. 36, N. Y.

INSTRUMENT TRANSFORMER SALES ENGINEER

Splendid opportunity for sales minded engineer to advance rapidly with major electrical manufacturer. Very pleasant headquarters location. Travel required. All enquiries will be kept absolutely confidential.

Write to

P-2098, Electrical World
520 N. Michigan Ave., Chicago 11, Ill.

SENIOR ELECTRICAL ENGINEER

Foreign Employment

Graduate EE with minimum 10 years' supervisory experience in utilities systems planning, study and design work. Must be generally familiar with power generation, transmission and distribution. For The Hague, Holland Engineering Office. Generous salary plus rent allowance. Liberal all-inclusive benefit program.

PROCESS ENGINEER

Graduate EE or ME with minimum 5 years' experience to handle technical aspects of power plant with gas combustion turbine integrated with steam plants, electrical motors, distribution and automatic control systems. 2 Years' supervisory experience desirable. For Operations Department located in Saudi Arabia. Generous salary plus living allowance: liberal all-inclusive benefit program.
Write giving full particulars regarding personal history and work experience.

Recruiting Supervisor, Box 148

ARABIAN AMERICAN OIL COMPANY
505 Park Avenue — New York 22, New York

RELAY TECHNICIANS

Foreign Service

Journeyman electricians. Minimum 2 years experience as a relay technician investigating and correcting line circuit troubles caused by relay failures. Unmarried man preferred.

Salaries $605 monthly plus generous living allowance; liberal, all-inclusive benefit program. Write giving full particulars regarding personal history and work experience.

Recruiting Supervisor, Box 165

ARABIAN AMERICAN OIL COMPANY
505 Park Avenue
New York 22, N. Y.

WANTED

SALES ENGINEER

with utility experience and the ability to handle all phases of new business connected with utilities. Age: Under 45. Liberal salary and traveling expenses.

P-1650, Electrical World
520 N. Michigan Ave., Chicago 11, Ill.

PLANNING ENGINEER

Electrical graduate, preferably with some experience in electric transmission and distribution work. To assist in planning development on utility system in New York State. Liberal fringe benefits. Salary open.

P-2079, Electrical World
330 W. 42 St., New York 36, N. Y.

WORK WANTED

Structural Engineer expert on switching stations, power stations and all outdoor structures. Available on consulting basis. WW-1891, Electrical World.

ENGINEERS

ELECTRICAL COLLEGE GRADS

DESIGN

Plants and Substations

DESIGN & OPERATION

1. Distribution & Transmission
2. Underground Network Systems
3. Relay Systems
4. Technical Studies

SYSTEM PLANNING ENGINEER

Seniors 8 + Juniors 2 +
Years Experience

Required by Operating Division of long established service and supervisory organization for large group of Electric Utilities located eleven Latin American countries. Some travel. Location New York. Usual employe benefits. Reply giving age, education, experience, personal particulars and salary expected.

AMERICAN & FOREIGN POWER COMPANY INC and SUBSIDIARIES
2 Rector St., New York 6, N. Y.
21st Floor — DI 4-4400 Ext 8494

REPLIES (Box No.): Address to office nearest you c/o this publication, Classified Adv. Div.
NEW YORK: P. O. Box 12 (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)
LOS ANGELES: 1125 W. 6th St. (17)

POSITIONS VACANT

Wanted—Electrical Engineer, can be recent graduate, for electrical control design work in an Engineering Department. Location at mining operation in northern New York. Salary commensurate with experience. P-1987, Electrical World.

Product Engineer—Graduate engineer with utility experience in transmission and distribution desired, for design and quality control with company manufacturing power line connectors, splices and deadends. Will work closely with sales and production departments as well as other engineers. We know this is the same old ad, but it got us a good man last time, and he has been promoted. Salary open. Reliable Electric Company, 3145 Carroll Avenue, Chicago 12, Illinois.

Operations Assistant Engineering graduate with utility operating experience and some knowledge of utility accounting. Work directly under direction of Vice President on analyses of property operations of diversified utility. Heavy travel. Submit complete resume and starting salary desired. P-1879, Electrical World.

Austrian manufacturer drumswitches and other industrial controls with office located New York requires energetic sales engineer able travel throughout USA. Drawing commission bright future. If interested write Box P-1943, Electrical World stating all qualifications which should include some electrical engineering experience.

POSITION WANTED

Electrical engineer, heavy experience utility system planning, age 38, desires position with consultant, small mfg. or utility, east. PW-2081, Electrical World.

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

BUSINESS OPPORTUNITIES — EQUIPMENT - USED or RESALE

UNDISPLAYED RATE:

$1.50 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.

PROPOSALS, $1.50 a line an insertion.

BOX NUMBERS count as one line additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED RATE:

The advertising rate is $14.00 per inch for all advertising apearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page.

EQUIPMENT WANTED or FOR SALE ADVERTISEMENTS acceptable only in Displayed Style.

SEND NEW ADVERTISEMENTS TO Classified Advertising Div. of ELECTRICAL WORLD, P. O. Box 12, N. Y. 36, N. Y.

MOTOR GENERATOR SETS

K.W.	MAKE	A.C.	D.C.
1250	Westg.	6600/4160	600
1000	G.E.	12,000	600
800	Westg.	2300	275
300	Westg.	2300/440	250
400	A.C.	2300	120/240
200	G.E.	2300	250/275
200	Westg.	2300/4000	250/275
200	Ridgeway	2300	250
170	G.E.	440	125
150	G.E.	2300	125/250
150	A.C.	2300	275
150	Westg.	2300	125/250
150	G.E.	440	275
125	Cr.Wh.	4160	125
100	G.E.	2300	250
100	Al.Ch.	2300	250
100	Elec.Mch.	440	125
100	G.E.	440	125
75	G.E.	440	125

CHICAGO ELECTRIC CO.
1324 W. Cermak Rd. Chicago 8, Ill.

FOR SALE
SUBJECT TO PRIOR SALE

200 Westinghouse Type CO, Inverse Time Relays, Rated 0.5/2.5 Amperes, 60 Cycle, with Universal Operation Indicator. In Modern Flexitest Cases Which Can Be Mounted Either Flush or Projection. All in First Class Condition. Can Be Used Interchangeably. Style Nos. 1271197, 1273197, 1545024 and 1545012. If Interested Contact N. C. Stirewalt, V. P., Central Illinois Public Service Company, Springfield, Illinois.

TRANSFORMERS

Qu. KVA Mfgr Type Form Voltage
3 1667 G.E. OAP VD 66,000-19,100/33,000Y

Priced For Quick Sale

MARYLAND PIPE & METALS COMPANY, INC.
304 West Church St. Hagerstown, Maryland

MOTORS · GENERATORS
TRANSFORMERS
NEW · REBUILT
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT CO.

PHONE STATION COLLECT GL 6741
131 BOX 31 ROCHESTER 1, NEW YORK

PERIODICALS

A.I.E.E. Transactions wanted to buy for cash and other technical and scientific periodicals. E. W. Ashby 27 E 21; N.Y.C. (10).

U. S. Government

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Invitation No. DS-4713) will be received at Denver, Colorado, until July 24, 1956, for furnishing one 1,475-kva, .95 pf, 450-rpm, 2,400-volt, 3-phase, vertical-shaft, hydraulic turbine-driven, outdoor-type, air-cooled, generator for Wanship Power Plant; and two 2,105-kva, .95 pf, 514-rpm, 2,400-volt, 3-phase, vertical-shaft, hydraulic turbine-driven, outdoor-type, air-cooled generators for Gateway Power Plant, Weber Basin Project, Utah. Delivery is desired within 360 to 480 days. For particulars, address Bureau of Reclamation, Building 53, Denver Federal Center, Denver 2, Colorado. W. A. Dexheimer, Commissioner.

TRANSFORMERS

SPECIAL PURCHASE

five carloads
13800 volt transformers
sizes 25 KVA to 250 KVA
new and slightly used

What can you use?
Write for list and prices

Many other items in stock

TRANSFORMERS WANTED

Reliable rewind and repair service on all makes of transformers

THE ELECTRIC SERVICE CO.

5316 Hetzel St.
Cincinnati 27, Ohio

40 Years' Dependable Service

ELECTRICAL WIRE AND CABLE

—YOUR BEST SOURCE—

- for every industrial and power application
- Odd lengths—long and short—reasonably priced

One of the Largest Stocks in the Midwest

Let us quote on requirements—
send your inquiries
We'll also buy your Surplus

Branch Office:
Houston—Walnut 3-4580
FOR YOUR TEMPORARY NEEDS TRY OUR SURPLUS DIVISION

UNIVERSAL WIRE and CABLE Co.

2929 N. Paulina St. Chicago 13, Ill.
EAstgate 7-4777 Code: UNIWIRE

SUBSTATION EQUIPMENT

TRANSFORMERS

QU.	KVA	MFGR.	VOLTAGE
4	2500	Mnl.	66,000—13800
1	2000	G.E.	66,000—2300/4000Y, 3 ph.
3	200	Pitts.	66,000—2300
3	1500	Wag.	44,000—6900/11950
3	1250	A.C.	44,000/11500—460
3	75	West.	44,000—7200/12470Y
3	5000	G.E.	38100/66000—6600
4	3333	G.E.	38100/66000Y—33000
4	3125	Mnl.	39900/66000Y—26600/46000Y
3	3333	G.E.	33000/11000—2400/7200
1	3000	A.C.	34500—2400/7200/12470Y, 3ph
2	3000	Stand.	33000—4160, 3 ph.
3	1500	A.C.	34,500—2300
3	667	A.C.	33,000—2400/4160Y
3	500	West.	34,400—13,800
4	333	Kuhl.	33,000—7200/12470Y
3	200	A.C.	34500—2400/7200/12470Y
3	75	Wag.	33000—240/480
4	1500	A.C.	25400/44000Y—6900/13800
3	100	G.E.	22000—7200/12470Y
3	50	G.E.	22000—2300
2	3000	G.E.	13800—600, 3 ph. Unit Sub.
3	1200	West.	13800—600, 3 ph. Unit Sub
1	1000	West.	13200—2300, 3 ph. Unit Sub
1	1000	A.C.	13800—480, 3 ph.
1	600	Stand.	13200—2300, 3 ph.
1	450	Penna.	13200—2400, 3 ph. ASKAREL
3	200	G.E.	13200—2400
1	2500	A.C.	11,000—2400/4160Y, 3 ph.
1	1500	G.E.	11,500—4000, 3 ph.
3	125	A.C.	6600—2300
3	333	G.E.	2400/4160Y—460
3	200	West.	2400—240/480
3	150	West.	2400—230/115
3	100	G.E.	2400/4160—120/240
1	100	G.E.	2300—575, 3 ph.
6	50	West.	2400—114/228, Dry Type

OIL CIRCUIT BREAKERS

6—600 A., 15 KV, G.E., FK-155, 350 MVA
1—600 A., 15 KV, G.E., FK-255, 100 MVA
2—600 A., 15 KV, G.E., FI.O-15, 50 MVA
2—400 A., 37 KV, G.E., FHKO-136, 350 MVA

ALSO: FREQ. CHGRS., M-G SETS, SYN. CONDENSERS, FEEDER REGULATORS, ETC.

BREW, WOLTMAN & CO., INC.

52 Church St. New York 7, N. Y

LARGE POWER EQUIPMENT

Prompt Stock Shipment
REHUBILT MOTORS - GENERATORS
TRANSFORMERS - CIRCUIT BREAKERS
DO YOU GET OUR STOCK LIST?

BELYEA COMPANY INC.
51 Howell St. Jersey City, N. J.

New and Used Equipment Available for
POWER PLANTS, SUBSTATIONS, TRANSMISSION LINES AND CONSTRUCTION
Send for new list to

EBASCO SERVICES INCORPORATED

APPARATUS EXCHANGE Two Rector St., New York 6, N. Y.

DIESEL ENGINES — POWER MACHINERY

DIESEL GENERATOR SETS—Stationary—Portable—Mobile
MOTORS and GENERATORS—100 KW to 1500 KW

A. G. SCHOONMAKER COMPANY, INC.
Main Office Box 516, Sausalito, Calif. Sausalito 1608
Branch 30 Church St., N. Y. 7, N. Y. Digby 9-4350

MEETINGS CALENDAR

JUNE

ATOMIC INDUSTRIAL FORUM, INC—Conference sponsored jointly with Denver Research Institute, Cosmopolitan Hotel, Denver, Colo., June 25-26.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Summer and Pacific General Meetings, Fairmount Hotel, San Francisco, California, June 25-29.

AMERICAN SOCIETY FOR ENGINEERING EDUCATION—Annual Meeting, Iowa State College, Ames, Iowa, June 25-29.

INTERNATIONAL ELECTROTECHNICAL COMMISSION—Deutches Museum, Munich, Germany, June 26-July 6.

* **ELECTRIC COMPANIES PUBLIC INFORMATION PROGRAM**—Mid-Atlantic Regional Group, Asbury Park, N. J., June 28.

AMERICAN CHIEF ENGINEERS' ASSOCIATION—Northwest Power Show, Minneapolis Auditorium, Minneapolis, Minn., June 28-July 1.

JULY

SOUTHEASTERN ELECTRIC EXCHANGE—Personnel Administration Section, General Oglethorpe Hotel, Savannah, Georgia, July 12-13.

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION—Council Meeting, Geneva, Switzerland, July 16-21.

NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS—Annual Convention, Sheraton Palace Hotel, San Francisco, Calif., July 24-27.

COLUMBIA UNIVERSITY INDUSTRIAL & MANAGEMENT ENGINEERING DEPARTMENT—Fifth Annual Utility Management Workshop, Arden House, Harriman, New York, July 29-Aug. 10.

AUGUST

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Heat Transfer Division, First National Conference, Pennsylvania State University, Aug. 11-15.

WESTERN ELECTRONIC SHOW AND CONVENTION—Pan Pacific Auditorium and Ambassador Hotel, Los Angeles, California, Aug. 21-24.

SEPTEMBER

NORTHWEST PUBLIC POWER ASSOCIATION, INC—Accounting Section, Cascadian Hotel, Wenatchee, Wash., Sept. 11-14.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—3rd Annual Electrical Conference of the Petroleum Industry, Kansas City, Mo., Sept. 12-14.

EDISON ELECTRIC INSTITUTE—Organization Meeting, sponsored jointly with AGA, Edgewater Beach Hotel, Chicago, Ill., Sept. 13-14; Industrial Relations Round Table Conference, Drake Hotel, Chicago, Ill., Sept. 17-19; Meter & Service Committee, Purdue University, Lafayette, Ind., Sept. 24-26.

PUBLIC UTILITIES ASSOCIATION OF THE VIRGINIAS—38th Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., Sept. 14-15.

ILLUMINATING ENGINEERING SOCIETY—National Technical Conference, Hotel Statler, Boston, Mass., Sept. 17-21.

INSTRUMENT SOCIETY OF AMERICA—11th Annual Instrument-Automation Conference and Exhibit, New York Coliseum, Sept. 17-21.

ATOMIC INDUSTRIAL FORUM, INC—3rd Annual Forum Conference and 2nd Annual Trade Fair, Morrison Hotel and Navy Pier, Chicago, Ill., Sept. 24-28.

PENNSYLVANIA ELECTRIC ASSOCIATION—Annual Meeting, Hotel Wm. Penn, Pittsburgh, Pa., Sept. 25-26.

ELECTRIC COMPANIES PUBLIC INFORMATION PROGRAM—Steering Committee, Blackstone Hotel, Chicago, Ill., Sept. 26; Workshop Conference, Blackstone Hotel, Chicago, Ill., Sept. 26-28.

OCTOBER

* **EDISON ELECTRIC INSTITUTE**—Prime Movers Committee, Hotel Radisson, Minneapolis, Minn., Oct. 1-3; Area Development Committee Meeting, Oct. 3 and Area Development Committee Workshop, Radisson Hotel, Minneapolis, Minn., Oct. 4-5; Electrical Equipment Committee, Hotel Statler, Cleveland, Ohio, Oct. 15-16; Transmission and Distribution Committee, Hotel Statler, Buffalo, N. Y., Oct. 18-19.

ILLINOIS INSTITUTE OF TECHNOLOGY—12th Annual National Electronics Conference, sponsored jointly by AIEE, Institute of Radio Engineers, University of Illinois, and Northwestern University, Hotel Sherman, Chicago, Ill., Oct. 1-3.

* **NATIONAL ELECTRONICS CONFERENCE**—12th Annual Conference and Exhibition, Hotel Sherman, Chicago, Ill., Oct. 1-3.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Fall General Meeting, Morrison Hotel, Chicago, Ill., Oct. 1-5.

CANADIAN ELECTRICAL MANUFACTURERS ASSOCIATION—12th Annual Meeting, Sheraton Brock Hotel, Niagara Falls, Ontario, Canada, Oct. 3-5.

STANDARDS ENGINEERS SOCIETY—Fifth Annual Meeting, Hotel Willard, Washington, D. C., Oct. 3-5.

INDIANA ELECTRICAL ASSOCIATION—Annual Convention, French Lick Springs Hotel, French Lick, Ind., Oct. 3-5.

SOUTHEASTERN ELECTRIC EXCHANGE—Sales Conference, Tides Hotel & Bath Club, St. Petersburg, Fla., Oct. 3-5.

INTERNATIONAL ASSOCIATION OF ELECTRIC LEAGUES—Sheraton-Cadillac Hotel, Detroit, Mich., Oct. 3-6.

ROCKY MOUNTAIN ELECTRICAL LEAGUE—Annual Fall Convention, Broadmoor Hotel, Colorado Springs, Colo., Oct. 7-10.

INTERSTATE POWER CLUB—Hotel Martinique, New York, New York, Oct. 8.

ILLINOIS INSTITUTE OF TECHNOLOGY—Conference on Computer Applications, Chicago, Ill., Oct. 9-10.

INTER-INDUSTRY FARM ELECTRIC UTILIZATION COUNCIL—National Power Use Workshop, Milwaukee Auditorium, Milwaukee, Wis., Oct. 15-16.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Electrification of Machine Tools Conference, Sheraton-Gibson Hotel, Cincinnati, Ohio, Oct. 22-24.

UNIVERSITY OF TEXAS—Ninth Power Distribution Conference, University Batts Auditorium, Austin, Tex., Oct. 22-24.

AMERICAN STANDARDS ASSOCIATION—38th Annual Meeting and 7th National Conference on Standards, Hotel Roosevelt, New York, Oct. 22-24.

NATIONAL SAFETY COUNCIL—44th National Safety Congress & Exposition, Chicago, Illinois, Oct. 22-26.

NOVEMBER

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION—Annual Meeting, Traymore Hotel, Atlantic City, Nov. 12-16.

EDISON ELECTRIC INSTITUTE—Industrial Relations Committee, EEI Headquarters, New York, N. Y., Nov. 15; Accident Prevention Committee, Statler Hotel, Hartford, Conn., Nov. 26-28.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—22nd National Exposition of Power and Mechanical Engineering, Coliseum, New York, N. Y., Nov. 25-30.

DECEMBER

* **EDISON ELECTRIC INSTITUTE-AMERICAN GAS ASSOCIATION**—1957 Conference Planning Committee, EEI-AGA Headquarters, New York, N. Y., Dec. 6-7.

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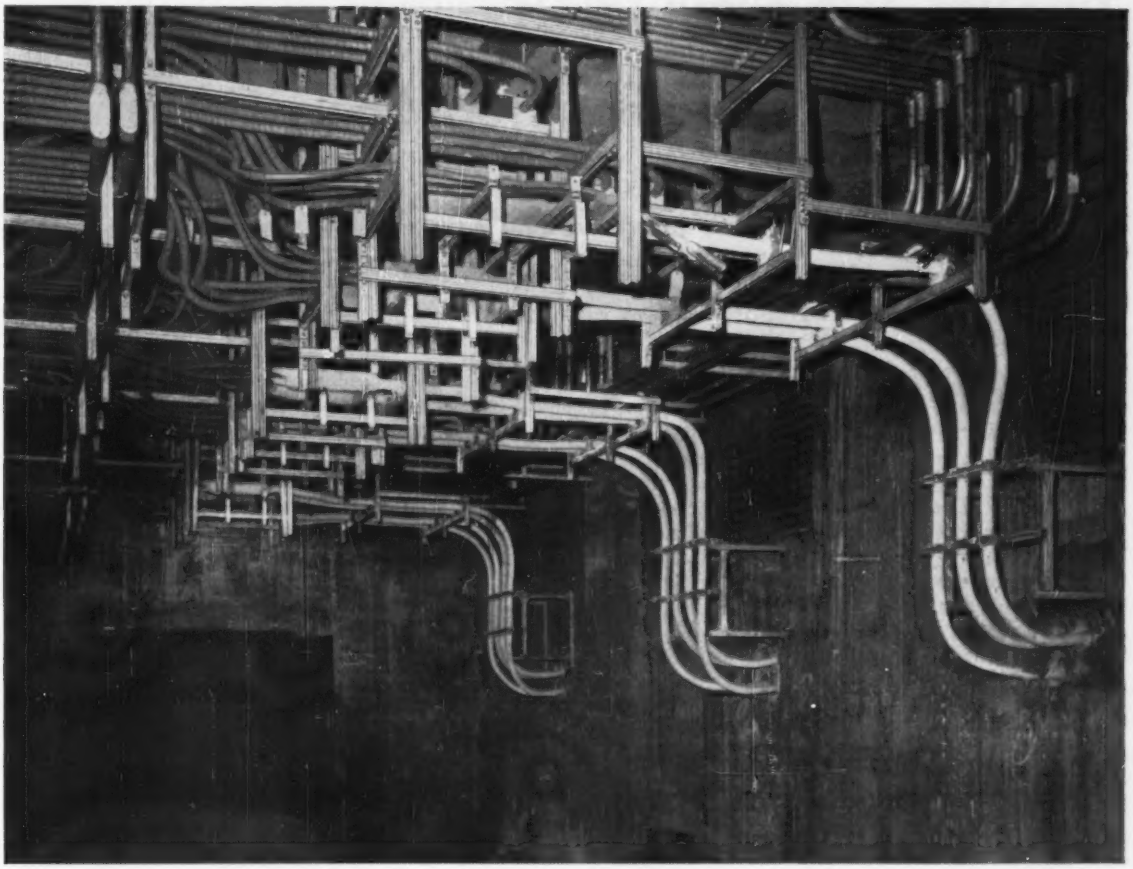
* Additions this week.



High voltage cable support and conduit racking in large municipal power plant.

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Future Debt Financing: Stop, Look, Listen

- **Utility bond yields show consistent, favorable trend: Treasury bill rates fall from 2.8% to around 2.50%**
- **Lower interest costs for long-term senior utility issues can be expected by midsummer or early fall**

Interest rates still hold the spotlight. When this subject was last discussed (EW, April 30, p 61), yields had risen almost to the high point of the firm money movement. Since then they have declined moderately, thus tending to confirm the admonition to "stop, look, and listen" before proceeding with any but absolutely necessary funded debt financing.

Underwriters' shelves now more closely resemble the famous cupboard of Mother Hubbard. They are relatively bare despite continued substantial offerings of utility senior securities.

Favorable Trend Indicated

One index of utility bond yield trends is a comparison of the average bids for new issues with the average original offering prices. At April 19, 13 such issues carried in a table in the "Wall Street Journal" showed bids averaging a yield of 0.16% per annum higher than the average of the original offering prices. By May 21 the increase in yield had fallen to 0.03% per annum, while as of June 14, average bids and original offering prices were practically the same. The issues comprised in this table are changed from time to time, and, naturally, issues of five or six weeks ago, offered at relatively high yields, would show more satisfactory comparisons than earlier ones. Nevertheless, a consistent trend is indicated—in the right direction.

In the short term money field, Treasury bill rates have fallen from nearly 2.8% to somewhere around 2.50% at current levels, with a general tendency to easier money in other short term items although prime commercial loan rates and rediscount rates remain unchanged.

Considerable opposition from authoritative sources has developed to the recent rise in rediscount rates by the Federal Reserve Banks. It would not be surprising to see some governmental action during the summer, designed to ameliorate high money rates —unless these should fall of their own accord. As the election approaches and it becomes increasingly evident that high interest rates are not needed to prevent a "bust" of the business "boom," political pressure in the direction of easing the plight of the borrower is likely to increase.

Quantity of forthcoming utility offerings indicate the perennial early summer slackening, but to a lesser degree than usual. Offerings of electric utility funded debt in May totalled $131 million versus $68 million already offered and presently scheduled for offering in June. July has a present indicated total of around $65 million for electric companies. In addition, American Telephone & Telegraph Co is scheduled to sell its $250-million debenture issue on July 10. These debentures contain such a high ingredient of common stock, because of convertibility, that it's hard to imagine the issue failing unless the equity markets took a fearful tumble.

All this sums up to a reasonable expectancy of somewhat lower interest costs for long-term senior utility issues by mid-summer or early fall.

Yields on recent new offerings of utility debt haven't been so high as to cause any stoppage in the flow of this type of financing, but they have been and still are high enough to warrant caution in proceeding with financing which could conveniently be postponed for several months or more without entailing financial difficulties.

Those issuers that were able to schedule offerings for early June rather than early May experienced moderate relief in money costs. The preponderance of evidence points to further gains on offerings held over to late summer or early fall. Naturally benefits from such deferral are not a "sure thing" but only a probability—based on what now looks favorable.

Little need be added about the sale of additional utility common stock. Despite recent slides in overall market averages, the utilities have held up reasonably well so that the "green-light" still shines brightly for issuers expecting to need this kind of money within the next year or so.

PUC Prescribes Restricted Surplus

The New Hampshire Public Utilities Commission, in prescribing a restricted surplus method in accounting for the tax deferral arising from liberalized depreciation provisions of Section 167 of the Internal Revenue Code of 1954, said:

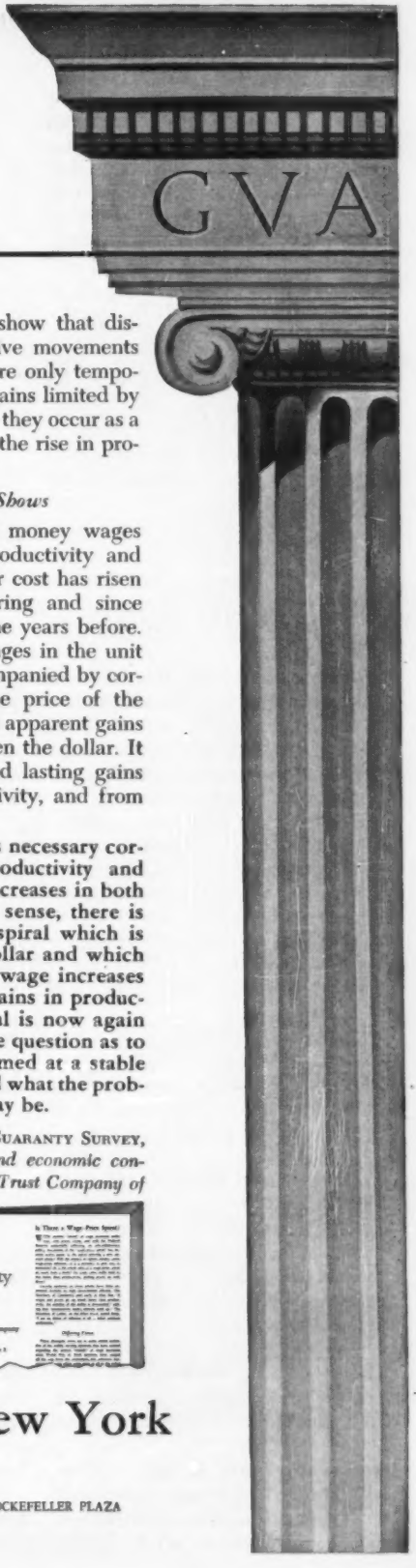
"**1.** The company shall accrue depreciation on its regular books of account on properties which are the subject of accelerated depreciation at rates consistent with its rates for like property not subject to accelerated depreciation.

"**2.** The company shall establish a sub-division of Account—'Taxes' to be entitled 'Provision for Deferred Federal Income Taxes' which shall be charged each year with an amount equal to the deferral of federal income tax resulting from the use of the accelerated depreciation deductions, and shall credit concurrently such amount to a sub-division of Account —'Earned Surplus'—entitled 'Surplus Restricted for Future Federal Taxes on Income.'

"**3.** Commencing with the year in which its deductions of depreciation for federal income tax purposes is less than such deductions otherwise would have been, the company shall charge annually, the Account—'Surplus Restricted for Future Federal Taxes on Income' with an amount equal to the

(*Continued on page* 278)

Is There a Wage-Price Spiral?



WITH another "round" of wage increases under way, with prices rising, and with the Federal Reserve apparently following an anti-inflationary policy, discussion of the "wage-price spiral" has become active again. Is the spiral entering a new upward phase? Will the impact of tighter money cause wage-price inflation (if it is present) to give way to recession? Or is the whole idea of a wage-price spiral no more than a myth? Do wage rates really tend to rise faster than productivity, pulling prices up with them?

If the official figures are to be relied upon, it is beyond doubt that the rise in money wages since World War II has exceeded the gain in productivity, although not by so much as is sometimes thought, and although most of the disparity developed during the single year 1951. It is also beyond question that the resulting rise in unit labor cost has been roughly paralleled by the increase in the price of the product.

This means that the increase in money wages over and above the rise in productivity has been largely or wholly lost to the workers, since they have to pay correspondingly more for the product.

Long-Term Tendencies

Other studies covering longer periods indicate that wage increases in excess of the rise in productivity tend to be absorbed in the price of the product, limiting labor's real gain to the actual increase in average output per man-hour. Such studies have been carried back far beyond the war and postwar years of strong unionism. They have been carried through periods of prosperity and depression, through periods of rising and declining prices, production, employment, wage rates, and hours of labor, and even through periods of price and wage controls. They show that disparities between the relative movements of labor costs and prices are only temporary. Not only are labor's gains limited by the rise in productivity, but they occur as a natural accompaniment of the rise in productivity.

What the Record Shows

The record shows that money wages have risen faster than productivity and that the average unit labor cost has risen accordingly, not only during and since World War II but for some years before. It shows further that changes in the unit labor cost tend to be accompanied by corresponding changes in the price of the product, wiping out labor's apparent gains and serving only to cheapen the dollar. It shows that labor's real and lasting gains come from rising productivity, and from this alone.

Since World War II this necessary correspondence between productivity and real wages has involved increases in both wages and prices. In this sense, there is undeniably a wage-price spiral which is tending to cheapen the dollar and which can be eliminated only if wage increases can be held in line with gains in productivity. Signs that this spiral is now again in an active phase raise the question as to how a monetary policy aimed at a stable dollar will deal with it, and what the probable effects on business may be.

From the June issue of THE GUARANTY SURVEY, *monthly review of business and economic conditions published by Guaranty Trust Company of New York.*

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Surplus Prescribed

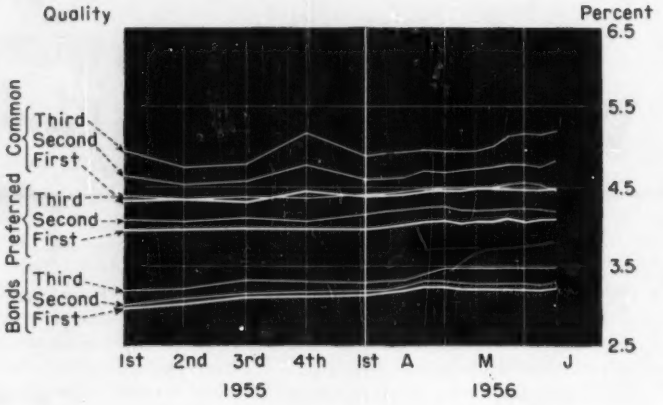
(*Continued from page 276*)

increase in federal income taxes resulting from such lower federal tax depreciation deduction until the balance therein is exhausted, and shall credit concurrently a sub-division of Account—'Taxes' to be entitled 'Current Income Tax Deferred in Prior Years.'

"and it is

"FURTHER ORDERED, that the Account 'Surplus Restricted for Future Federal Taxes on Income' will continue subject to our jurisdiction, and our future appropriate orders, including the disposition of any balances in the account which in the future may be in excess of the deferred Income Tax liability."

Today's Utility Yields (%)



	BONDS			PREFERRED STOCKS			COMMON STOCKS		
QUALITY.....	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
June 14.....	3.21	3.28	3.48	4.10	4.20	4.48	4.49	4.82	5.18
June 7.....	3.21	3.28	3.48	4.10	4.21	4.48	4.52	4.76	5.18
May 31.....	3.21	3.28	3.48	4.09	4.24	4.49	4.47	4.79	5.18

FINANCIAL BRIEFS

Middle South Utilities, Inc, will earn in the neighborhood of $2.15 a share in 1956 as compared with $1.95 in 1955, Edgar H. Dixon, president, told the annual stockholders meeting recently. He added that "earnings have been progressing nicely and exceeding our budgets by some margin to date this year."

First Boston Corp 'group has sold quickly 180,000 shares Boston Edison Co 4.25% $100 par cum preferred stock at $101.625 a share to yield 4.18%.

Louisville Gas & Electric Co will pay July 16 a quarterly common stock dividend of 55¢ a share as compared with 50¢ in the previous quarter.

Green Mountain Power Corp stockholders voted for a 2-for-1 common stock split. Company directors declared a quarterly common stock dividend of 25¢ a share, payable July 2. Payments on the old common stock had been 45¢ a share.

Palo Alto, Calif., voters approve a $1,250,000 bond issue to expand the city-owned electric distribution system.

Black Hills Power & Light Co has asked the Federal Power Commission for approval to issue $300,000 in common stock and to sell $1 million first mortgage bonds due 1986 to Equitable Life Assurance Society at 99⅛%.

Portland General Electric Co will pay July 14 a quarterly common stock dividend of 30¢ a share as compared with 27½¢ a share in the previous quarter.

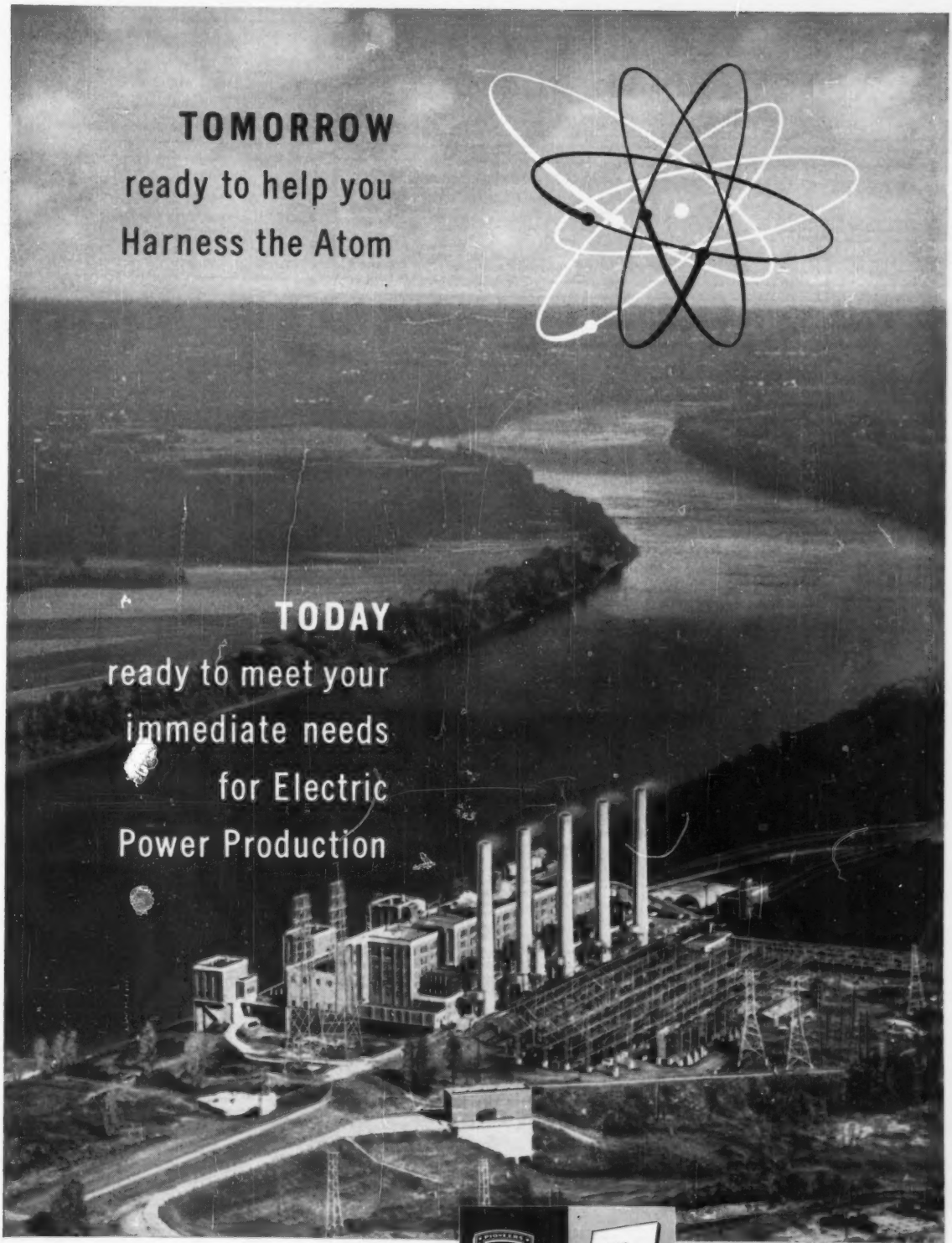
Iowa Public Service Co has asked the Federal Power Commission for authority to assume the assets of Sac County Electric Co, Sac City, Iowa, and to issue 26,874 common shares to be exchanged with the latter company in lieu of any cash payment.

Union Electric Co has filed a registration statement with the Securities and Exchange Commission seeking registration of $40 million of first mortgage bonds, series due 1986, to be offered for public sale at competitive bidding.

Utility Earnings

COMPANY	PERIOD MONTHS ENDED		NET INCOME 1955	NET INCOME 1954	EARNINGS PER COMMON SHARE 1955	EARNINGS PER COMMON SHARE 1954
American & Foreign Power, consolidated	12	Dec.	$14,465,771	$13,752,625	$2.00	$1.90
Brazilian Traction, Light & Power	12	Dec.	18,492,251	19,849,015	....	....
Sacramento Municipal Utility District	12	Dec.	3,735,585	3,268,311	....	....
			1956	1955	1956	1955
Arizona Public Service	12	April	$5,653,000	$5,124,000	31.43(a)	$1.52(a)
El Paso Electric	12	April	2,236,245	2,158,472	2.51	2.41
Gulf Power	12	April	2,668,550	2,151,652	....	....
Mississippi Power	12	April	2,372,580	2,091,240	....	....
Mississippi Power & Light	12	April	4,273,212	3,904,234	....	....
Ohio Power	12	April	17,598,833	15,510,796	....	....
Ottawa Valley Power	12	April	193,837	217,263	3.88	4.35
City of Seattle Department of Lighting	12	March	5,803,738	5,135,996	....	....
Southern Canada Power	7	April	1,089,162	962,401	....	....
West Texas Utilities	12	April	3,407,822	3,250,394	....	....

Notes—Figures for the first three companies have been audited; (a) Based on average number of shares outstanding.



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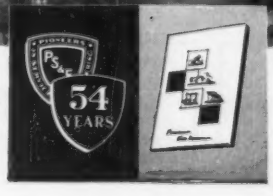

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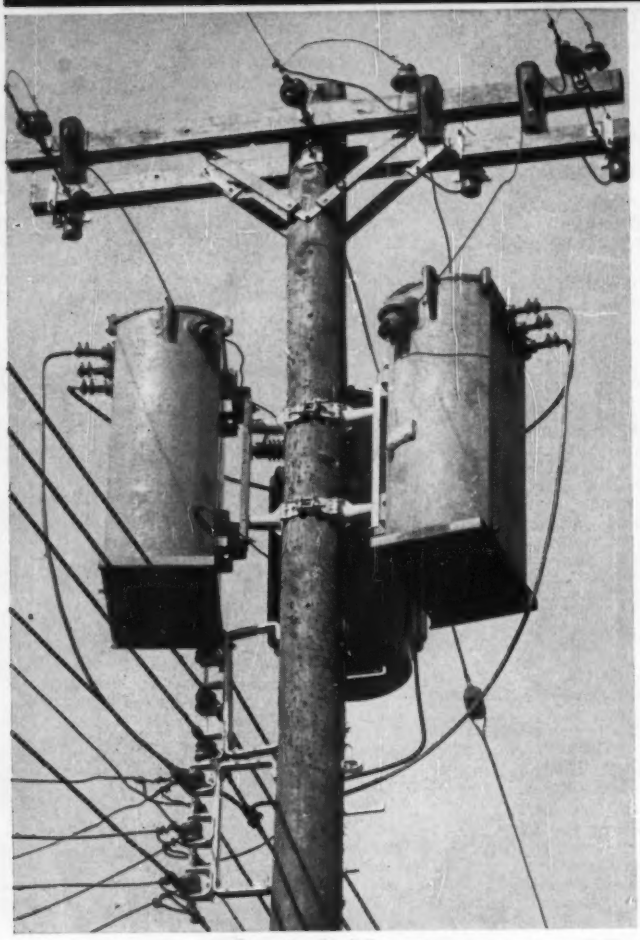

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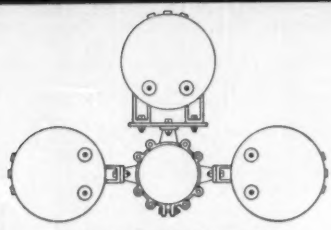

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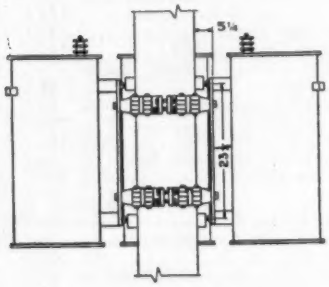


Cat. No. 3-50-10

The FLEXI-BAND Transformer Mount Rack is as easily adjusted to the contour of the pole as tightening your belt. No more need to hammer the band, drill the pole, or measure the exact centers of the bands in installation. You simply estimate or measure the approximate pole diameter at the point of installation, and use the same number of band links as the corresponding inches of the pole diameter, with the exception that the transformer link is equal to 1½" of pole diameter.

Completely Salvageable, All Parts Hot Galvanized. Do It BETTER, FASTER and For LESS.

Mount any combination of transformers from 3 KVA through 100 KVA on this economical and better pole loading FLEXI-BAND cluster transformer mount racks. SAVINGS up to 25% over cross arm mounted transformers, plus better material quality control.

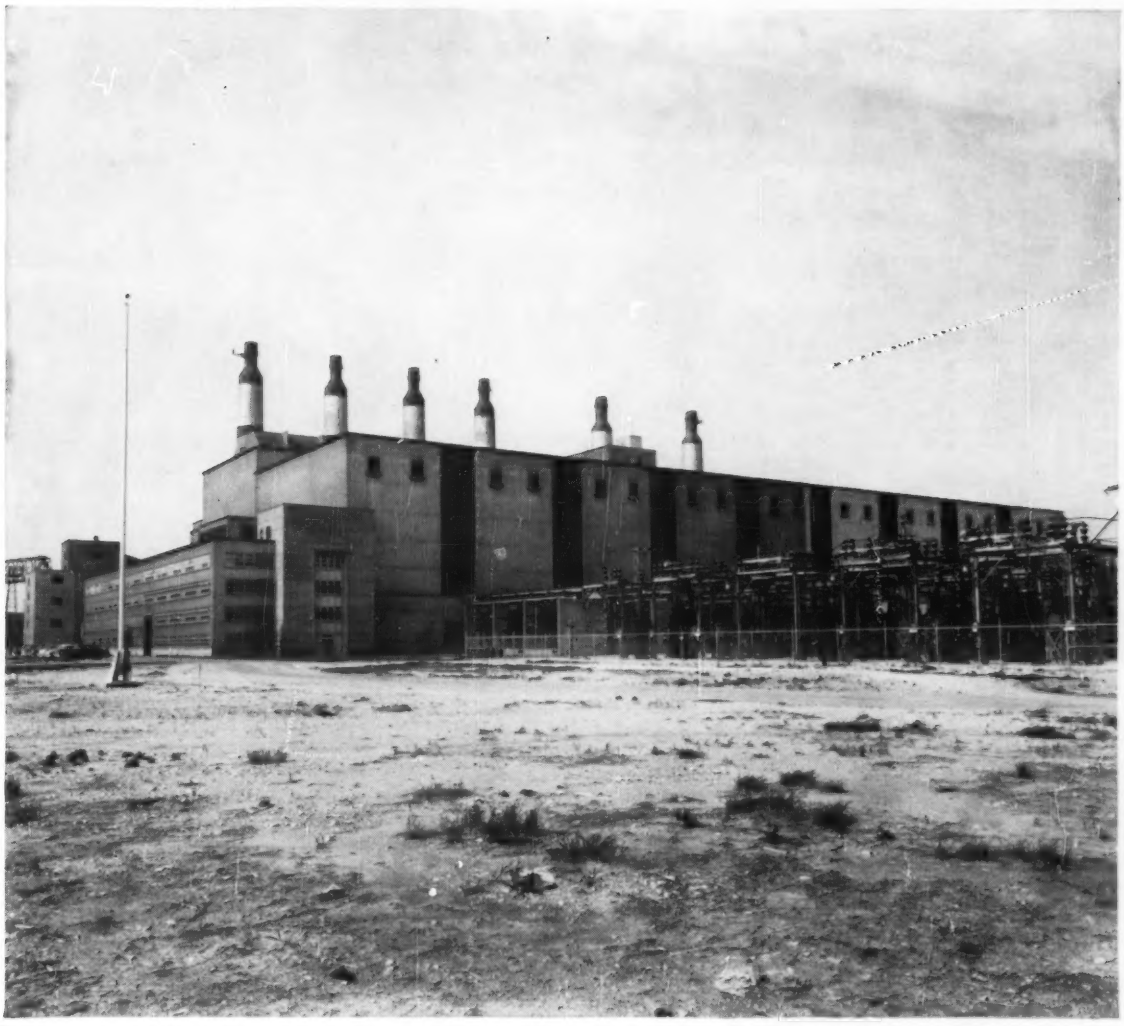
MAY WE SUGGEST THAT YOU STOCK A NUMBER OF THESE STANDARD LINKS IN YOUR STOREROOM AND ON EACH OF YOUR LINE TRUCKS, SO THAT ANY SIZE FLEXI-BAND CAN BE MADE TO FIT ANY FIELD INSTALLATION WITH A MINIMUM OF LOST TIME AND EFFORT.

THE BEST
COSTS NO MORE

See Bulletin 201

TURNER ELECTRIC CORPORATION

P.O. Box 803, Edgemont Station, EAST ST. LOUIS, ILLINOIS



COMMONWEALTH EDISON CO. Ridgeland Station

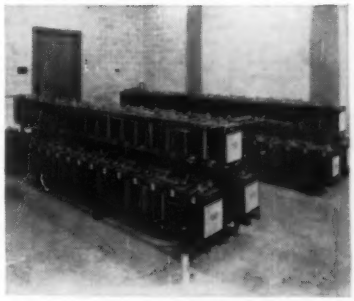
Leading Power Companies Use Exide Batteries

Less than 6 years ago, this modern generating station went into operation with its first generating unit. Since then, three additional units have been added, bringing the net capacity to 640,000 kilowatts, enough to supply the power demands of the rapidly growing Chicago metropolitan area.

Here, as at many other up-to-date, growing power companies all over America, Exide-Manchex Batteries were selected for control and emergency service. Years of use in the power field has earned Exide-Manchex a reputation for long life and large capacity reserve unsurpassed by any other battery. This is because no other battery has the same unique construction.

If you would buy batteries with assurance of dependability and long life, take this extra measure of care when you order. Specify Exide-Manchex. That's what other leading power companies do. For complete information, write Exide Industrial Division, The Electric Storage Battery Co., Phila. 2, Pa.

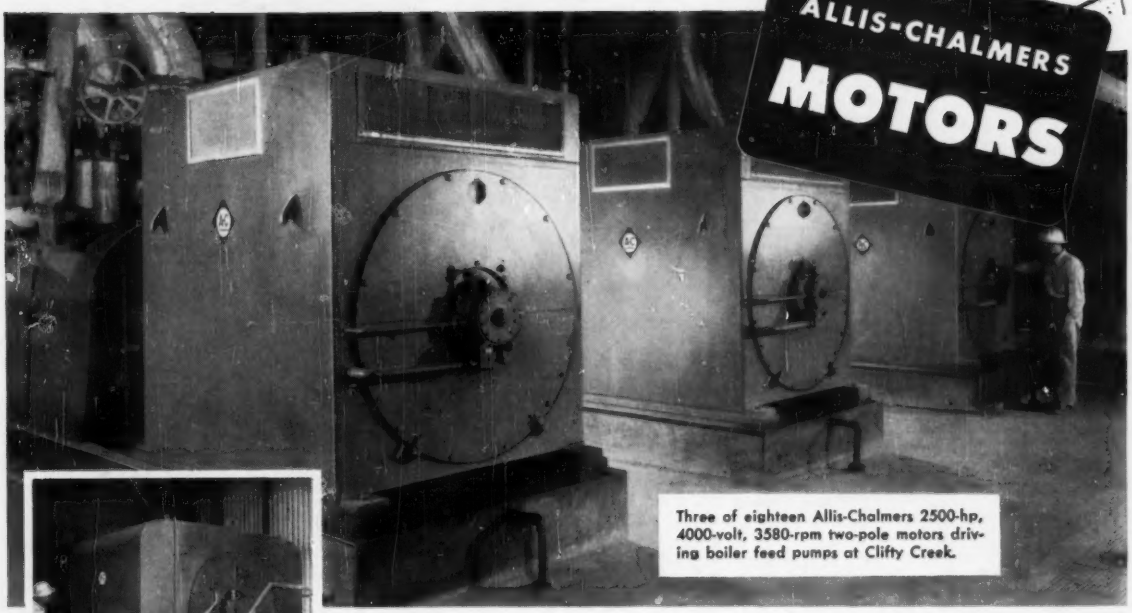
Exide®



LONG LASTING POWER. Since the Ridgeland Station first began operations, this 108-cell Exide-Manchex Battery has been in constant service, providing a dependable power source for control and emergency use. Time and time again, Exide-Manchex Batteries have proved their long life and ample capacity. Yet today's batteries are better than ever. They incorporate improvements developed out of Exide's continuing research activity.

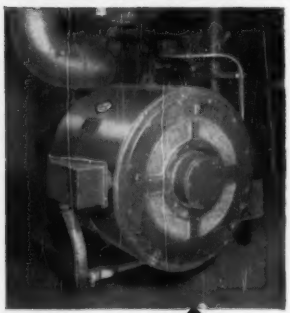
Furnishing Major Auxiliary Drive Power

at Indiana-Kentucky Electric Corporation's Clifty Creek Plant



Three of eighteen Allis-Chalmers 2500-hp, 4000-volt, 3580-rpm two-pole motors driving boiler feed pumps at Clifty Creek.

Rooftop installation of Allis-Chalmers 1500-hp, 4000-volt, 1185-rpm weather-protected motors. This is one of twelve Allis-Chalmers motors giving dependable service driving forced-draft fans at this modern new plant.



Allis-Chalmers 250-hp flange-mounted motor driving plant air compressor. This unusually economical mounting method for such a large motor can be attributed to Allis-Chalmers experience in motor applications throughout the electric power industry.

A wide variety of Allis-Chalmers motors furnish most of the major auxiliary drive power at Clifty Creek Plant near Madison, Indiana. Allis-Chalmers motors are driving plant air compressors, coal handling equipment, forced-draft fans, boiler feed pumps and many other pumps.

The Allis-Chalmers motors at this Indiana-Kentucky Electric Corporation installation are just a few of the complete line of motors Allis-Chalmers builds for power plant service. Contact the Allis-Chalmers district office in your area, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin, for complete information.

A-4956

Now, You Can Get Even Greater Winding Protection with SILCO-FLEX

all-silicone-rubber motor insulation. Available only on Allis-Chalmers motors — in many of the larger sizes. Ask your A-C representative for the facts about this revolutionary new insulation system.

Silco-Flex is an Allis-Chalmers trademark.

A-C ALLIS-CHALMERS

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